Pit and Quarry

With which is consolidated CEMENT-MILL & QUARRY

Member Audit Bureau of Circulations

Read in Largest Number of Plants

Published Biweekly on Wednesday for Producers and Manufacturers of Sand, Gravel, Stone, Cement, Gypsum, Lime, and Other Non-Metallic Minerals.

Subscription price: $5 for 3 years, $2 for 1 year in the United States and possessions, North, Central and South America; elsewhere $1 additional for each year. Single copies 20c.

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Vol. XX CHICAGO, SEPTEMBER 24, 1930 No. 13

CONTENTS

Pure White Pigments and Aggregates Are Made from Dolomite.....22

Large Rotary Lime Kilns Fabricated by Welding Process Prove Success.....27

Practices in Winning Rock Salt Resemble Those Employed in Coal Mining.....31

Conglomerate Gravel Compels Producer to Abandon Hydraulic Dredge.....35

Quarry Blast in Chicago Suburb Brings Down 24,000 Cu. Yd. of Stone.....40

Sioux City Ready-Mixed Concrete Plant Was Built for Winter Service.....41

What the Paleozoic Submergences Did for Illinois and the Middle West.....44

This Iowa Producer Keeps Performance Records of All Machinery.....51

Engineers and Equipment Manufacturers Discuss Road-Building Problems.....55

Finds Pre-Mixed Concrete Field "Made to Order" for Gravel Producers.....58

Northwest Regional Cement Safety Meet Held at Seattle, Wash.....61

Men of the Industry.....63

Personal Mention.....64

Coming Events.....65

Financial News.....66

Latest Portland-Cement Statistics.....67

Traffic News and Comment.....69

Review of Foreign Practice.....70

Recent Patents.....71

Legal Information for Operators.....73

Insurance Problems Discussed.....74

New Machinery and Supplies.....75

Manufacturers' Publications.....79

Next Issue, October 8, 1930

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Producers Unite in $10,000,000 Merger

MIDWEST CONCERNS INVOLVED

The Moulding-Brownell Corporation has been formed to take over the business and assets of a group of Chicago and midwestern companies engaged in the production and sale of building materials. The companies included in the merger are the Moulding Brick Co., the Brownell Improvement Co., the Federal Stone Co., the Superior Stone Co., the Wisconsin-Wilcox Co. and the American Sand and Gravel Co. Total assets of the new concern will be over $10,000,000.

The properties of the new company will be located in four states and will have facilities for producing upwards of 6,500,000 tons of materials annually, besides extensive wholesale and retail distribution, including eleven distributing plants in the Chicago area. The consolidation has resulted in the creation of a concern which ranks among the largest in the country in its field.

J. R. Sensibar, president of Construction Materials Corp., is chairman of the board of the new corporation and W. P. Hodgkins, president of the Brownell Improvement Co. (picture on page 63, this issue), is president. Other officers include, T. J. McGuire of the Moulding Brick Co., vice-president and general manager; Daniel Goley, James W. Adler and T. F. Quilty, vice-presidents; and Daniel J. Gallory, secretary and treasurer.

The companies concerned in the new company have been engaged in the building material industry for many years. The oldest company in the new combine is the Thomas Moulding Brick Co. which is the largest distributor of face brick in the Chicago district and has been in the business for sixty-two years. The Brownell Improvement Co., in business for almost forty years, has a plant with a producing capacity of 10,000 tons of crushed stone daily.

Mr. Hodgkins stated that signs "point, in our opinion, very positively to a revival in the building industry." He continued that the new company hopes to be able to contribute something to the full development of the building movement by means of an organization designed to serve the public interest efficiently and economically.

"Although Construction Materials Corporation is not included in the consolidation which is being effected, it will have a substantial interest in the new company and the new company will take over the Chicago docks of Construction Materials. We shall enjoy the full benefits of low-cost transportation which has been developed by that company. This is a factor of very great importance as, with heavy commodities such as we deal in, transportation cost is one of the major items entering into the ultimate cost," said Mr. Hodgkins.

Completes Construction of New Dock Facilities

U. S. Phosphoric Products Corp., Tampa, Fla., will complete construction of its new dock facilities by the end of September. A traveling gantry crane has been installed with a capacity of 200 tons of bulk material per hour for unloading. There will be tracks to accommodate at least 50 cars at one time, with track storage for about 500 cars. Machine shops will be available for repair work, and arrangements will be made to supply coal and oil for fuel purposes. The investment will be about $5,000,000.

Lets Contract to Build Nineteen Storage Silos

The Cumberland River Sand Co., of Nashville, Tenn., has awarded a contract to Foster & Creighton, also of Nashville, for the erection of nineteen steel and concrete storage bins at its plant. The Stephens-Adamson Mfg. Co., of Aurora, Ill., was given the contract for the installation of new conveyors. The new improvements will add greatly to the company's storage and handling facilities, according to R. N. Coolidge, president.

Harold M. Scott Named President of Keystone

Harold M. Scott, formerly general sales manager of the Atlas Portland Cement Co., has been elected president of the Keystone Portland Cement Co., the executive offices of which are in Philadelphia and the plant at Bath, Pa. The Atlas Portland Cement Co. was acquired in January by the United States Steel Corporation.

New Cement Plant to Be at Macon, Miss.

WILL COST ABOUT $2,500,000

The Portland-cement plant to be constructed by the recently-organized Mississippi Portland Cement Co. will probably be located at Macon, Miss., a town in the east-central part of the state, north of Meridian, according to W. S. Guest, of Philadelphia, Miss., one of the organizers.

The new plant, according to reports, will cost in the neighborhood of $2,500,000.

B. R. Alford of New Orleans, designer of the Chattanooga, Tenn., plant of the Signal Mountain Portland Cement Co., has been chosen as the engineer to design and construct the new Mississippi plant.

U. S. Gypsum Purchases Canada Plaster Concern

The Canadian Gypsum Co., a subsidiary of the United States Gypsum Co., has acquired the Albert Manufacturing Co. of Hillsboro, N. B., one of the largest plaster manufacturing companies in Canada.

S. L. Avery, president of the United States Gypsum Company, when asked about the deal said: "We have acquired through one of our subsidiaries the Albert Manufacturing Co. of Hillsboro, N. B., the oldest operating gypsum company in the world, and a leader in the dominion's gypsum industry. This company's mines were operated first in 1813 and it was chartered as a corporation in 1856. Its product has been and is unique for purity and color.

"The plant is a modern and expensive one. The company has a wide Canadian distribution, besides a large export business with British possessions. The business and its assets are valued at over $1,000,000. The purchase was made through the medium of an exchange of stock.

"This acquisition will add largely to our Canadian business. The property will be operated under its present name and management, but as a subsidiary of the Canadian Gypsum Co."

International's 1929 Trophy Is Dedicated

HONOR PLANT'S SAFETY RECORD

The safety trophy presented to the International Portland Cement Co. of Spokane, by the Portland Cement association in recognition of the company having operated its plant during 1929 without a lost-time accident, was dedicated at 3 o'clock Saturday afternoon, Sept. 6.

H. M. Heleniak, secretary and sales manager, presided. The employees of the company, residents of the Spokane valley and invited guests made a party of several hundred for the dedication. The chairman presented the officials in attendance as well as W. G. Perrow, district manager, and H. H. Helwig, superintendent of the Lehigh Portland Cement Co., and invited quests.

A. J. R. Curtis of Chicago, assistant general manager of the Portland Cement Association, made the presentation of the monument in an address in which he said:

"Until recently it was conceded that any cement plant had to have accidents and many of them in the ordinary process of making cement. Those who are familiar with the hazards of cement making marvel that any plant could operate a year or even a much shorter period without an accident serious enough to cause even a day's loss of time to a single workman. The Spokane plant, in operating throughout 1929 without a lost time accident, takes its place at the head of the American cement industry, and as this industry had the lowest accident rate of any American industry last year, your organization should be recognized as the safety leaders of American industry.

"This concrete monument which we are dedicating here today is unique in that it is erected in honor of the living rather than the departed.

"The Portland Cement Association hopes that this trophy, bearing new inscriptions for future perfect records, will remain as a constant inspiration and reminder."

The monument was then unveiled and accepted by John P. Hartman of Seattle, one of the original directors of the International Portland Cement Co., and still a member of the board.

Miss Francene Briggs, teacher of the school at Irvin, drew the string that unveiled the monument.

Mr. Hartman said: "This honor is to you, the men now before us, who each thought more of the safety of the man next to him than possibly himself. It was teamwork and cooperation that made possible a year without loss of time by accident. Rarely is this done, and it was done solely because first the superintendents at the mill and quarry saw that every safety device possible was provided, and then you men at mill and quarry watched and watched so that no one was injured."

Chairman Heleniak read the following telegram from J. B. John, vice-president and chairman of the committee on accident prevention of the Portland Cement Association:

"The Portland Cement Association and cement mills throughout America are proud of your safety record, and on their behalf I send hearty congratulations and best wishes for your continued success. The stand taken by your company officers as well as by every workman deserves highest praise."

A telegram of congratulation was also read from C. A. Irvin, vice-president of the Alpha Portland Cement Co. of Chicago. Mr. Irvin was the first general manager of the International Portland Cement Co. and Irvin station at the cement plant was named after him.

After the dedication the party adjourned to the schoolhouse at Irvin, where a luncheon was served by the International Portland Cement Co.

Indiana Seeks Royalty on Lake-Dredged Gravel

Following the lead taken by the state of Michigan in requiring dredging concerns to pay the state a royalty for sand and gravel removed from the Great Lakes bordering on the state, Indiana, through its conservation department, is contemplating the establishment of a royalty charge against all sand companies that dredge in Lake Michigan.

No definite action has been taken at present but a hearing was to have been held recently at Michigan City, Indiana's most important lake port, to consider payment of such royalties. Several Indiana dredging companies operate in Lake Michigan.

Gets Federal Contract for Project in Illinois

The Keeler Quarry, located near Grafton, Ill., has obtained a government contract to furnish crushed stone for the federal deep-waterways project near Jerseyville, Ill.

C. E. Keeler, one of the partners, reports business good with future prospects even better. The Keelers own another large stone quarry and plant at Louisiana, Mo., which was acquired only recently.

Deep-waterways work on the Mississippi and Illinois rivers has brought considerable business to other crushed-stone producers in that area this summer.

Develop Stone Quarries on Cape Breton Island

The Dominion Iron & Steel Co., Ltd., of Sydney, N. S., Can., is planning the development of limestone quarries on Cape Breton Island, N. S. The deposit, which is about seven miles from Sydney, is a continuation of the company's quarries at Point Edward, N. S.

Eastern Office for Gypsum Association

SCHWEIM NOW ON WEST COAST

The Gypsum Association held its regular quarterly meeting, Sept. 9, at the Bismarck Hotel, Chicago, with fourteen delegates in attendance. In addition to Henry J. Schweim, executive secretary and chief engineer, the following companies were represented by officials:

Best Bros. Keene's Cement Co., by C. S. Downs.
Certain-teed Products Co., by C. O. Brown and Warren Henley.
Ebsary Gypsum Co., by Fred G. Ebsary.
Grand Rapids Plaster Co., by James Leenhouts and James Bale.
National Gypsum Co., by M. H. Baker and R. F. Burley.
Structural Gypsum Co., by A. J. Campbell and J. Miller Porter.
Texas Cement Plaster Co., by J. W. Jacobs, v. p.
United States Gypsum Co., by C. F. Henning.
Universal Gypsum & Lime Co., by Eugene Holland.

The Pacific Coast Cement Co. of Seattle, Wash., was elected to membership in the association.

The meeting arranged to open the proposed New York branch office about Nov. 1, with J. Kent Smith, engineer, in charge.

At a special session of the Technical Problems Committee, after lengthy discussion of many angles of the subject, a sub-committee was selected to make a detailed study of the best lines for research, the best methods for conducting investigations, the cost of engaging the service of outside educational or research organizations to do the work, and the expense of maintaining an association research laboratory and an adequate staff. This sub-committee's report will be rendered at the next quarterly meeting.

The standard specifications that have been proposed for gypsum plaster by various trade organizations and the American Society for Testing Materials was submitted to the Technical Problems Committee.

On Sept. 22, Mr. Schweim started upon a business tour of the Rocky Mountain and Pacific Coast regions to meet groups of gypsum manufacturers and to explain the aims of the association and the benefits attending membership therein. He will spend some time in Denver, Colo., and Salt Lake City, Utah, before going to Long Beach, Cal., where he will attend the Pacific Coast Building Officials Conference, Sept. 29 to Oct. 4. Upon his findings, the association will consider the advisability of establishing a branch office on the Coast.

Acquires 68-Acre Tract Near Lexington, S. C.

Palmetto Quarries Co., Columbia, S. C., has acquired a 68-acre tract containing a rock quarry at Lexington, S. C., and has also acquired the right of way extending from Southern Railway line to the property.

Arrange to Exhibit Machinery at Show

GATHERING HELD AT CHICAGO

With the largest attendance in its history the Manufacturers' Division of the National Sand & Gravel Assn. met at the Stevens Hotel, Chicago, Sept. 18 and 19, to discuss various problems of the machinery exhibition to be held in connection with the association's coming national convention in St. Louis next January. Under the guidance of Chairman M. B. Garber the business meeting Friday morning quickly disposed of the questions raised.

On a motion made by H. M. Davison of the Harnischfeger Corp., the members voted to appoint an allocation committee to meet a similar committee of the National Crushed Stone Assn., in order to decide on the allocation of exhibition space at the coming conventions of both associations. The sand-and-gravel convention, scheduled for Jan. 27 to 29, follows the crushed-stone convention, set for Jan. 19 to 22, and most of the exhibitors will display their products at both. These naturally want to use the same space at both expositions to avoid moving their exhibits, and a joint meeting of the allocation committees of both associations will seek to accomplish this, while guarding the interests of those exhibitors who will show their products at only one of the conventions.

Mr. Ahearn, the secretary, reported that the smallest opening at the exhibition hall will admit any equipment not wider than 7 ft. or higher than 9 ft., and that the floor will bear a weight of 200 lb. per sq. in. with safety.

He announced also that, by arrangement with the railroads, all attendants at the two conventions and that of the American Road Builders' Assn. which will be held during the week preceding the crushed-stone convention, will be given a reduction of 25 per cent from the regular railroad fare. Thus, those attending the road builders' convention can stay over for the crushed stone and sand-and-gravel conventions, and those present at the crushed-stone convention can remain for the sand-and-gravel convention and still benefit by the reduced rate. Certificates entitling members to the lower fare can be obtained from the secretary of either association.

At the committee meeting held Thursday afternoon various ways of increasing the association's revenue through the Manufacturers' Division were discussed, and these were considered at the open meeting on Friday. Of the three ways suggested—increasing the number of members, raising the associate membership fee, and raising the rental charge for exhibition space—the last was the one most favored. After much discussion it was decided to raise the booth rental from $50 (the present figure) to $75, this to include the cost of booth furniture and entertainment. The chairman was instructed to inform the association of the manufacturers' willingness to bear part of the expense of carrying on its work, which is continually increasing and calls for larger budgets each year.

Frank A. Bingham and J. R. Thoenen, members of the committee formed to arrange programs for the operators' sessions at the convention, spoke of their tentative plans. Mr. Thoenen, through his work at the U. S. Bureau of Mines, has been making rapid progress in this direction. The bureau appoints chosen operators as consulting engineers. Each one is asked to prepare a study of the operations at the plant under his charge, and these reports are then published by the bureau. The data thus collected will form the basis of further studies on separate quarrying operations to be prepared by the bureau. After hearing particulars about this work the members voted to appoint a committee to work with Messrs. Bingham and Thoenen toward the development of a complete program for coming conventions.

Abe Goldberg, chairman of the Nominating Committee, read his committee's recommendations and these were elected by a unanimous vote. The new officers of the Manufacturers' Division are: M. B. Garber, chairman; C. H. Adamson, H. M. Davidson, D. D. Guilfoil, W. H. Potter, Bruce G. Shotton, and L. W. Shugg (General Electric Co.), vice-chairman.

The following men were present:

C. H. Adamson, Stephens-Adamson Mfg. Co., Aurora, Ill.
V. P. Ahearn, executive secretary, National Sand & Gravel Assn.
H. L. Bachman, Jaeger Machine Co., Columbus, O.
Frank A. Bingham, Northern Gravel Co., West Bend, Wis.
F. E. Blanchard, Climax Engineering Co., Chicago, Ill.
V. C. Browne, A. Leschen & Sons Rope Co., St. Louis, Mo.
Grant Davis, Ohio Power Shovel Co., Lima O.
H. M. Davison, Harnischfeger Corp., Milwaukee, Wis.
Irwin F. Deister, Deister Machine Co., Ft. Wayne, Ind.
M. B. Garber, Thew Shovel Co., Lorain, O.
Abe Goldberg, Allis-Chalmers Mfg. Co., Milwaukee, Wis.
D. D. Guilfoil, Sauerman Bros., Inc., Chicago, Ill.
Victor H. Jones, Smith Engineering Works, Milwaukee, Wis.
Delbert Kay, Nordberg Mfg. Co., Milwaukee, Wis.
M. A. King, Good Roads Mchy. Co., Kennett Square, Pa.
M. S. Lambert, Robins Conveying Belt Co., Chicago, Ill.
R. N. McMurry, Transit Mixers, Inc., Chicago, Ill.
Perry Nagle, American Manganese Steel Co., Chicago Heights, Ill.
E. J. Patton, Stephens Adamson Mfg. Co., Aurora, Ill.
S. A. Phillips, PIT AND QUARRY, Chicago, Ill.
W. H. Potter, Manganese Steel Forge Co., Philadelphia, Pa.
N. C. Rockwood, *Rock Products*, Chicago.
I. J. Ryan, Manitowoc Shipbuilding Corp., Manitowoc, Wis.
F. S. Salchenberger, Morris Machine Works, Baldwinsville, N. Y.
A. K. Schifflin, Link-Belt Co., Chicago, Ill.
Bruce G. Shotton, Hendrick Mfg. Co., Carbondale, Pa.
Ralph C. Sullivan, *Rock Products*, Chicago, Ill.
J. R. Thoenen, U. S. Bureau of Mines, Washington, D. C.
F. O. Wyse, Bucyrus-Erie Co., South Milwaukee, Wis.

New Inland Plant to Operate by November

PROGRESS SATISFIES OFFICIALS

Active operation of the new plant of the Inland Lime & Stone Co. at Port Inland, near Manistique, Mich., is assured by the latter part of October or the first of November, according to announcement made by company officials this week. The company expects to obtain a number of contracts for delivery of rock this fall.

Clarence B. Randall, vice-president and William Sykes, chief engineer, visited the operations recently and expressed approval at the rapid progress which is being made in the construction work. The Merritt, Chapman and Scott Corp. has entirely completed its work on building the breakwater and dock. All of the other contracts are progressing nicely and some of the largest machinery is to be installed next week.

The rapidity with which the work has been carried on this summer has been a source of satisfaction to company officials.

Indiana Deposits Sold to American Aggregates

Announcement has been made that the American Aggregates Corp. of Greenville, O., formerly the Greenville Gravel Co. has purchased the R. A. Buchanan farm located on state road 24 east of Lake Cicott, Ind. The farm contains 154 acres and was bought for the sand and gravel which is said to be of excellent quality. The price paid for the farm was not made public.

Work on the newly acquired property is not scheduled to start at any set time and may not begin for several years, according to reports.

Idaho Portland Cement Pays $13,000 Dividends

Eugene Enloe, president of the Idaho Portland Cement Co., has announced that $13,000 was disbursed by the company on September 15 in dividends and interest.

Interest and dividends are calculated from the date of the original investment by the shareholders in the property, the interest being calculated on the money put in during the period of construction and dividends from the time the plant went into production. The payment brings the return to the stockholders down to the date of July 1, 1929. Another payment is expected to be made in January and eventually the dividends will be brought up to date. There is no bonded debt.

Mr. Enloe is the largest single stockholder in the company and has recently increased his holdings.

Dyer Quarry Proves Modern Merchandiser

USES EFFECTIVE ADVERTISING

One of the progressive merchandisers, as well as producers, of pit-and-quarry materials is the John T. Dyer Quarry Co., of Norristown, Pa. The Dyer quarries and plant which produce trap rock are located at Birdsboro, Pa.

"Trap Rock for Roads Saves Money in the End" is the slogan carried on all Dyer advertising material. A mailing piece recently issued by this concern has just come to the attention of PIT AND QUARRY. It is a two-color, 4-page folder that is quite effective in its appeal and is certain to bring more business to this enterprising operator.

The first page, printed in orange and black, attracts the eye when it says: "Why try to determine the relative merits of road building by means of brain twisters like these (pointing to a reproduction of a page of complicated formulæ), when, actually, the only equation that need interest you is . . . "

Turning the page the prospect continues to read: "2 plus 2 equals four! in which, as a mathematican would put it, the first 2 is the fact that by every geological and engineering test, trap rock is by far the hardest, toughest, least soluble and absorbent, and most enduring road-building stone known to man; whereas the second 2 in the 'equation' is the further fact that: for your community, situated as it is within easy shipping distance of the great Dyer Quarries at Birdsboro, Pa., even the first cost of trap rock is little, if any, higher than that of ordinary road-building stone; so that, naturally, the sum of these two facts, or the 4 in our simple 'equation,' must necessarily mean that in your roads, either as the coarse aggregate in concrete or as the primary material in any penetration type of road, Dyer's Birdsboro trap rock will always save money in the end."

Allen Sails to Conduct Road Delegates to U. S.

T. Warren Allen, Chief of the Division of Management, Bureau of Public Roads, U. S. Department of Agriculture, sailed from New York September 13 on the S. S. *George Washington* to conduct, on the return trip, a group of European delegates to the Sixth International Road Congress to be held at Washington, D. C., October 6-11. That the visiting highway officials may have in advance comprehensive information about American methods of road construction, administration and finance, and the development of highway transportation in the United States, Mr. Allen will give, on the *George Washington*, a series of lectures on these subjects, illustrated with motion pictures. As a complement to the lectures, the Bureau of Public Roads will have on board an exhibit of models of roads and bridges, and of photographs, and statistical charts. The S. S. *George Washington* is scheduled to return from Hamburg, on September 26, stopping at Cherbourg and Southampton on September 27 and Queenstown on September 28, arriving in New York on October 4. The large party of European delegates on board will be met by members of the American Organizing Commission.

Superior Portland Has Good Business Prospect

With a continued increase in cement sales over last year, with large contracts booked for the balance of the year, and with its factory at Concrete, Wash., operating under most favorable conditions, E. P. Lucas, president of Superior Portland Cement, Inc., reports his company in a healthy condition. So much so, in fact, that the board of trustees at its monthly meeting held in September, after reviewing operations and sales for the first eight months of the year, and looking ahead into the future, authorized the payment of a dividend on the Class "B" common stock of 25 cents per share. This was payable September 20 to stockholders of record September 15. This makes a total of 75 cents paid during 1930 on the common stock.

Alabama Concrete Firm Enjoying Active Season

The Mobile, Ala., Ready Mixed Concrete Co., Inc., one of the important pre-mixed concrete concerns in the South, has been quite busy this past season. Among the buildings for which it supplied concrete were Sears, Roebuck & Co., a new high-school gymnasium and swimming pool, Southern Bell Telephone Co., Postal Telegraph Co., Mobile Gas Co., Mobile Light and Power Co., and the Western Union.

The plant has a capacity of 250 cu. yd. per day. R. W. Greene, Jr., is manager and secretary-treasurer.

Niagara Slip Fills to Require 15,000 Cu. Yd.

The Niagara Boulevard, between Niagara Falls and Bridgeburg, will be shortened by three miles by the construction of a road across the old shipyard property. Half a mile of road will be made along the edge of the river and will eliminate dangerous curves on the Parkway. Engineers are surveying the road now and construction will be almost completed this year, but there will be no traffic until early spring of next year. Two large steamship slips will have to be filled, requiring around 15,000 cu. yd. of material, which will be allowed to settle during the winter and be finally surfaced early next year.

Marble Development Seen at Andrews, N. C.

QUALITY DEPOSIT REVEALED

Large scale operation of a marble quarry is projected near Andrews, N. C., as a result of the discovery of what is said to be a large deposit of marble of a color and quality that is considered fine.

The quarry, located five miles west of Andrews, near Highway No. 10 and the Southern railway, is operated by the Carolina Marble Quarries, Inc. For some weeks work has been almost at a standstill, due to the fact that the marble at the point where the concern had been working was exhausted.

It is planned to uncover the new quarry and start operations on a large scale. The company is said to be financed by New York capitalists.

Ingalls Stone Company Employees Enjoy Frolic

The Ingalls Stone Co. of Bedford, Ind., the largest independent company in the limestone industry, held its tenth annual picnic for employees and their families on Sept. 6. In addition to Bedford employees there were more than one hundred from Romona, where the company has another quarry. Company representatives from several cities inspected the quarries and mills during the outing. Athletic events, horseshoe pitching contests, an address by the Rev. Harry T. Bridwell of Clear Creek, Ind., and music and dancing were on the program.

Marl Deposit Is Found Near Posey Lake, Mich.

A deposit of marl covering several acres and reported to have an approximate depth of 22 ft. has been located in Hudson Township, Mich., near the west end of Posey Lake. M. E. Caner, on whose farm the deposit is found, stated that recent tests indicate 99 per cent lime content. The deposit is very close to the surface, in some places only a few inches.

Transit-Mixed Concrete in Government Building

Transit-mixed concrete is being used in the construction of U. S. Government buildings at San Bernardino, Cal., where the Robert E. McKee Co. has commenced work on the Federal building at Fifth and D streets. This is said to be the first large job to be constructed of transit-mixed concrete in California.

Heavier Demand for Building Materials

GOOD VOLUME IN CHICAGO AREA

The pavers and road builders throughout the entire Chicago district have been taking advantage of the fine weather of late and have taken heavy shipments from the plants, pits and quarries in their cement, sand, gravel and crushed stone contracts. By far the heaviest tonnage movement of rough materials was for street paving and road work.

There was still a spotty demand for materials from the country dealers for most of the materials and it was evident that they are holding back until such time as they can get some definite line as to the fall consumer demand before putting large stocks in their warehouses. A seasonal pickup in the demand for roofing materials developed and the asphalt shingle plants are operating at capacity.

The volume of business done by the retail yards has been rather small but the demand is diversified and there was a call for virtually all materials such as are carried in stock. Stocks of lake sand put in the dock yards this summer are reported ample to take care of the needs of the trade through the winter season.

Ruling retail prices, delivered to the jobs, quoted in the Chicago building material market, follow:

Portland cement, in cloth, per bbl., $2.35. Portland cement in paper, per bbl., $2.10. Crushed stone, per cubic yard, $2.00. Screenings, per cubic yard, $1.65. Crushed or roofing gravel, per cubic yard, $2.00. Torpedo sand, No. 1, per cubic yard, $2.25. Torpedo sand, No. 2, per cubic yard, $2.00. White sand, bulk, load lots, per ton, $8.50. White sand, paper bags, load lots, per ton, $9.50. Lake and bank sand, per cubic yard, $2.00. Wisconsin bulk lime, per bbl., $1.50. Wisconsin lime, in wood, per bbl., $2.60. Wisconsin hydrated, in paper, per ton, $16.00. Plasterer's hydrated, per ton, $17.00.

Canadian Road Builders Convene in Quebec City

The seventeenth annual convention of the Canadian Good Roads Association was held September 16, 17 and 18 in Quebec City. Representatives of Roads Departments of the various Provinces and also road engineers of the various municipalities throughout Canada together with executives of industries, railways and other companies interested in good roads were in attendance.

Rhode Island Prepares to Beautify Its Roads

During the January session of the General Assembly of Rhode Island an Act was passed authorizing the State Board of Public Roads to plant trees, shrubs, and otherwise beautify roadsides along state highways. This act is certainly worthy of note and should be emulated by other states. Too little attention is paid to the roadside, the idea seemingly prevalent is that so long as a good road exists any attempt at the æsthetic is superfluous.

The road program of Rhode Island for 1930 includes some 60 miles of reinforced concrete, bituminous macadam and sheet asphalt laid on a concrete base. Expenditures for both state and town systems in 1930 are estimated at $5,785,000 of which the anticipated maintenance outlay will be about $800,000.

Oregon Portland Cement for New Seattle Bridge

The Pacific Coast Cement Co., Seattle, Wash., secured the contract for the Portland cement to be used in the construction of the Aurora Street bridge at Seattle and the first bulk shipment was delivered during the week ended August 16. The pouring of cement is now under way on the main piers of this bridge, which is being erected for the state highway department and, when completed, will be one more of Seattle's public works marking milestones in the civic progress of this great western city.

Sand and Gravel Corp. Buys Reserve Property

Rich deposits of gravel a short distance west of Logansport, Ind., have been acquired by the American Aggregates Corp., formerly the Greenville Gravel Co.

While the site now being worked by the company is sufficient for from three to eight years, according to H. W. North, plant manager, the new property will take care of the future when the present pits are exhausted.

First Award at Boulder Dam to San Pedro Firm

The Merritt, Chapman & Scott Corp. of San Pedro, Cal., has been awarded the first contract to be given for work on the Boulder dam project when the Union Pacific Co. railroad accepted the firm's bid of $115,000 on a 30-mile railroad to be built between the main line and the dam site.

The San Pedro corporation's bid on grading, trestle and culvert work was the lowest of 20 estimates submitted by contractors from several western states.

Plans New Stone Plant Near Russellville, Ky.

R. E. Greely, of the Greely Stone Co., St. Paul, Inc., has leased a limestone deposit near Russellville, Ky. Core drilling is under way and the work of erecting a plant and stripping of overburden preparatory to producing crushed stone is expected to begin shortly.

Highway Delegates to See U. S. Roads

TOUR TO FOLLOW CONGRESS

Three hundred invitations have been issued to official and other delegates to the Sixth International Road Congress to participate in the highway inspection tours sponsored by the Highway Education Board, following the sessions of the Congress from October 6 to 11. These invitations have gone to the outstanding highway engineers and administrative officials of more than sixty countries.

The Highway Education Board with headquarters at 1723 N Street, Washington, is sponsoring the invitation tours which follow the Congress. The chairman of the board is Thomas H. MacDonald, chief of the Bureau of Public Roads, and on the board are the following members:

Dean F. L. Bishop, Society for the Promotion of Engineering Education.
Wilbur J. Carr, Assistant Secretary of State.
Roy D. Chapin, National Automobile Chamber of Commerce.
J. Walter Drake, Former Assistant Secretary of Commerce.
Pyke Johnson, National Automobile Chamber of Commerce.
Fred I. Kent, American Bankers' Association.
H. H. Rice, National Automobile Chamber of Commerce.
L. S. Rowe, Director General, Pan American Union.
W. O. Rutherford, Rubber Manufacturers Association, Inc.
F. A. Seiberling, Rubber Manufacturers Association, Inc.

The tours have been arranged to afford the delegates participating an opportunity to acquire first-hand information on the construction, maintenance and use of all types of modern highways in the United States.

The delegates invited to participate will be divided into groups of the same size for each tour. The first tour will be devoted to a study of high-type, heavy-traffic roads in densely populated industrial areas, including metropolitan developments.

Makes First Shipment of Asbestos Products

The first shipment of asbestos products from the plant of the Asbestos-Talc Products Co., of Bellingham, Wash., was made early this month, according to press reports. The company's office, warehouse, and plant are located in Bellingham, with its mines a short distance away from the city.

Products include wall filler, sound-deadener packing and pipe covering, according to C. E. Woolen, president.

The raw asbestos and talc are trucked to the factory from the mines where they go through the refining process. To produce filler and pipe covering the material is sent through a crusher, rollers, and sieves and shakers. It emerges a fine powder. For deadening this powder is mixed with wood pulp amounting to about 2 per cent of the whole. This is thoroughly mixed and sacked.

Crusher and storage bin at right, and warehouse in foreground.

Pure-White Pigments and Aggregates Are Made from Dolomite

Raw Material, Quarried in Michigan, Is Processed in Fine Milwaukee Plant

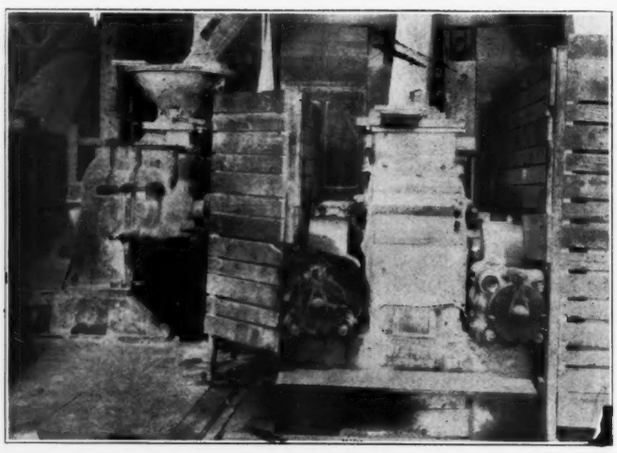
By EDWARD COPPS, JR.
Assistant Manager, Metro-Nite Co.

THE Metro-Nite Co., of Milwaukee, has long been engaged in the manufacture of inert paint pigments and crystalline aggregate for use in the manufacture of cast-stone, ornamental concrete, plastic wall finishes, and for stucco dash.

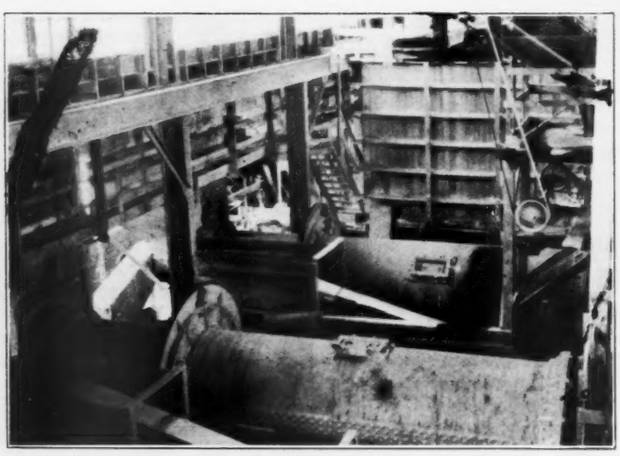
Analysis

Calcium carbonate	44.62 per cent
Magnesium carbonate	35.65 per cent
Calcium-magnesium silicates	19.58 per cent
Moisture	0.15 per cent
	100.00 per cent

The main office and plant are located at Milwaukee, Wis., and the mines producing the crude mineral are in Dickinson County in the Upper Peninsula of Michigan. The Metro-Nite Co. owns and operates the only known deposit of this mineral in the country.



Crushing rolls in foreground, ring roll on left.



Tube mills for pulverizing Metro-Nite fines into pigment.

Metro-Nite possesses a superb sparkle which is one of the chief reasons for its popularity in the manufacture of ornamental concrete products. It is known as the whitest aggregate and its color does much to beautify concrete of all kinds. This accounts for its use in the manufacture of concrete lamp-poles, as it adds beauty to the ordinary cement surface and the common aggregate. Metro-Nite is extremely hard and has a crushing strength of 23,590 lb. per sq. in., so that its addition to a concrete

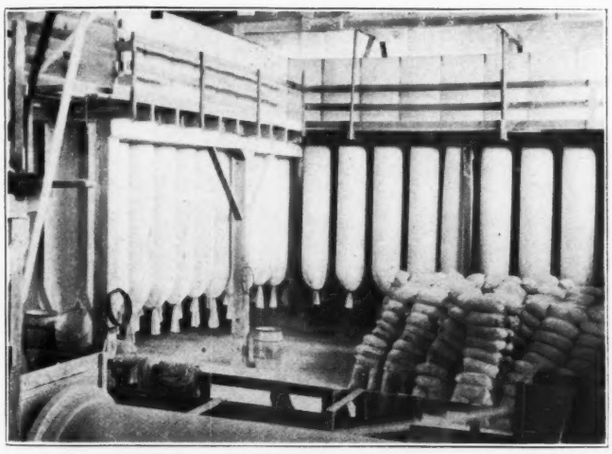
mix adds greatly to the strength of same and acts as a reinforcer.

The analysis of Metro-Nite is such that it makes an ideal paint pigment for use in mixed paints, paste paints and enamels of all kinds. It has a most peculiar liking for lead and zinc pigments and mixes readily with them. It is the whitest inert pigment on earth and has dense covering power. It has a fine tinting strength and bulks more, with less oil, than any of the other inert extenders. Because of its extremely fine particle-size and uniform gradation, it remains well in suspension and does not cause pigment settling.

Raw Material

Metro-Nite occurs in a massive deposit covering several forty-acre tracts of land. The main portion

A side-dumper empties the material into railroad cars.



Dust-collecting flume and bags.

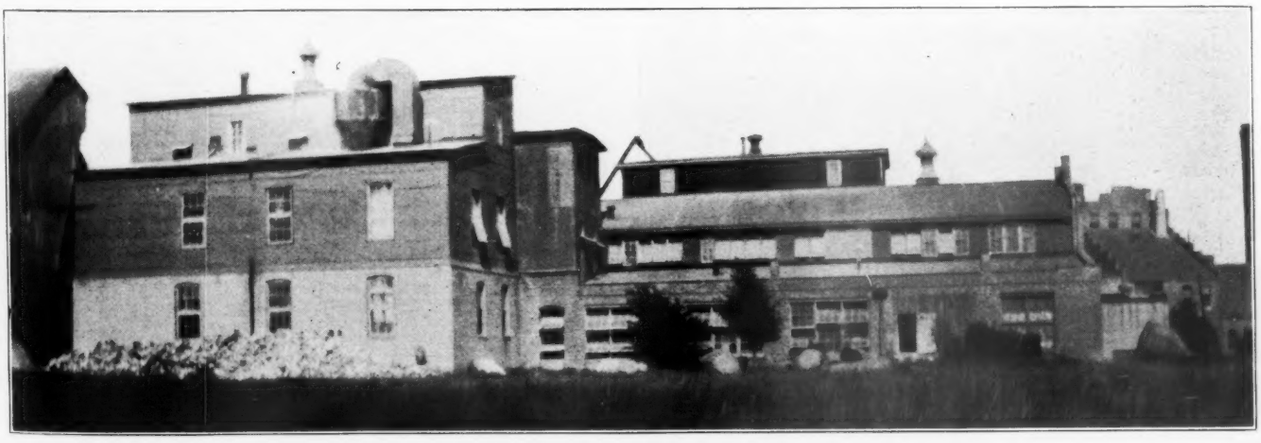
of the deposit is a large outcrop which forms a long hill from the end of which the company mined about 50,000 tons of mineral before starting downward. At present, operations are conducted in an open pit which measures over 100 ft. square and about the same depth.

Due to the hardness of the material, it is necessary to do much drilling and blasting. An air line from the engine-house to the pit furnishes the air for the hammer drills. The engine-house encloses an Ingersoll-Rand, Class ER-1, 12-in. by 10-in. air compressor, driven by a Westinghouse 65-hp. motor and a large receiver under pressure of 8 lb. The distance from the receiver to the quarry is about 1,000 ft. The air-line is of 3-in. pipe. Upon reaching the quarry the air-line branches to the various workings with 1-in. pipe.

The drills used are all Hardsocg Wonder drills, No. 66, Size 2, equipped with hexagon, hollow, drill-steel bits. The bits are kept in perfect shape at all times by an expert blacksmith, with the aid of a Hardsocg Wonder drill sharpener, also run by compressed air. The blacksmith shop and engine-house are equipped with an excellent set of tools and are well prepared to handle any emergency which may arise.

The company usually keeps about four drillers busy. After blasting the crude Metro-Nite from the massive deposit, from six to eight men get at the mineral with hammers and reduce all pieces of reasonable girth to the desired mass, which is anywhere from 25 lb. to 150 lb. The larger chunks moved with the blast and too large to be broken with the sledges are again drilled and pop-holed, after which they are ready for loading.

The floor of the quarry pit is laid with 18-in.-gauge steel track on which run three trucks, each bearing a large steel skip or box capable of a 3-ton load of crude Metro-Nite. After being filled, they



The Metro-Nite fine-grinding plant.

Battery of hoppers that supply the tube mills.

are lifted from the pit with the aid of a Sasgen derrick equipped with a hoist and a turntable manufactured by the National Hoisting Engine Co. The unit is powered with a Le Roi 4-cyl. engine.

Upon reaching the top of the quarry, the boxes are dumped into a Koppel side-dump car which, in turn, is run to the box-car that is being loaded. The track runs in one door of the car and out through the other side to the waste piles. Should any material loaded into the dump boxes by the miners be below the standard, it is noticed by an inspector at the car, and he sees that the off-grade crude is run through to the waste piles. It is this policy of careful selection that is greatly responsible for the high quality of pigment produced by The Metro-Nite Co.

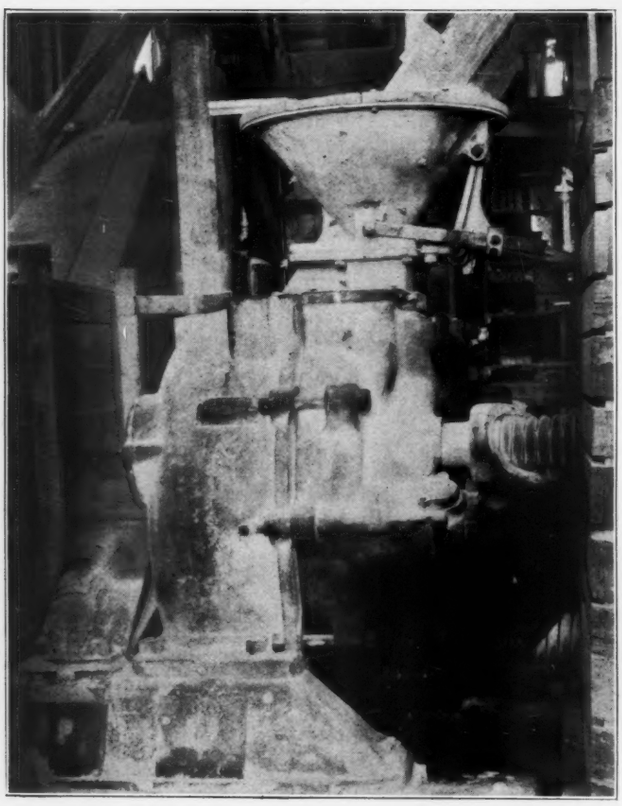
The main pit is drained by a sump 11 ft. square and equally as deep, which is located at the lowest level of the quarry floor. This sump is pumped dry by a Fairbanks-Morse 3-in. centrifugal pump, driven by a Lincoln 10-hp. electric motor. With its present equipment the mine is capable of producing 150 tons of crude Metro-Nite per 8-hr. day.

All raw material shipped from the mine is loaded into the best of box-cars, no open cars being used for transit to the mills at Milwaukee. This precaution insures a clean, dry delivery, with the crude mineral in perfect condition for the milling process.

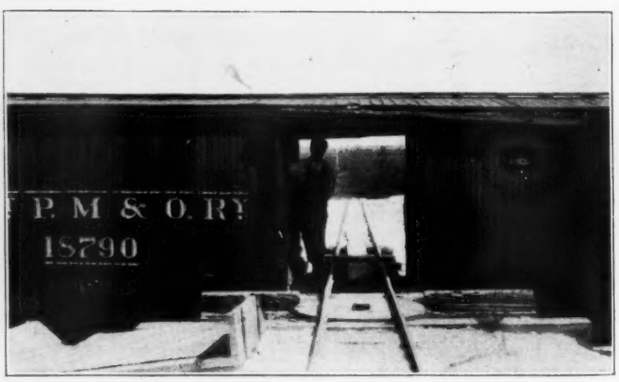
Milling

Upon arrival at the Milwaukee plant, the raw material is unloaded from the box-cars and is fed into a 13-in. by 30-in. Farrell jaw crusher driven by a 50-hp. Allis-Chalmers motor. This initial operation reduces the crude to approximately 2 in. A large bucket elevator on 65-ft. centers retrieves and delivers the stone to the top of the 3,000-ton storage bin. Here it is received by a belt conveyor on 60-ft. centers, traveling the entire length of the bin and equipped with automatic dumping devices which facilitate equal distribution and filling of the bin. The large storage bin has been so designed as to provide cross ventilation throughout, thus protect-

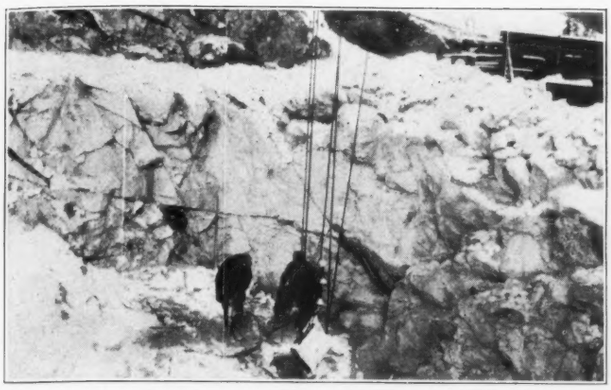
The primary jaw crusher.



Ring rolls furnishing fine material to the tube mills.



The shipping track is laid into each box car.

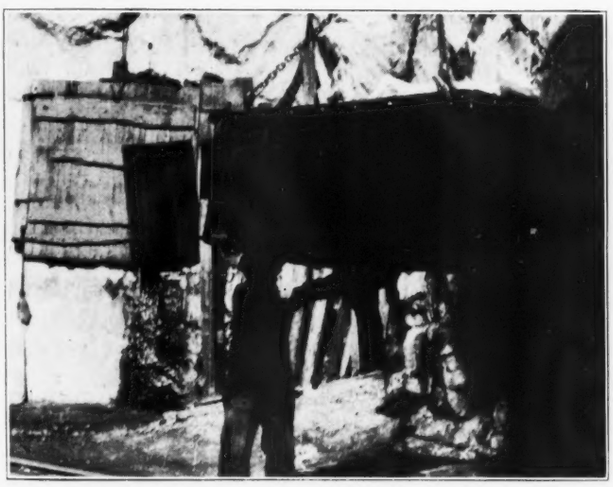


Drilling in a small pit.

ing the material from dust and dirt and keeping it absolutely dry at all times.

The 3,000-ton storage house is built on a massive concrete foundation under which is a 6-ft. by 6-ft. concrete tunnel running beneath the company's double railroad siding, for a distance of some 200 ft., to the main pulverizing mill. In this tunnel is a 20-in. belt conveyor running its entire length and carrying the 2-in. Metro-Nite to the secondary crusher, a Telsmith No. 2 reduction crusher of the gyratory type. From this crusher, the material is taken by a bucket elevator, on 20-ft. centers, and deposited into a 15-ton hopper.

If aggregate of the coarser sizes, such as ⅜-in.

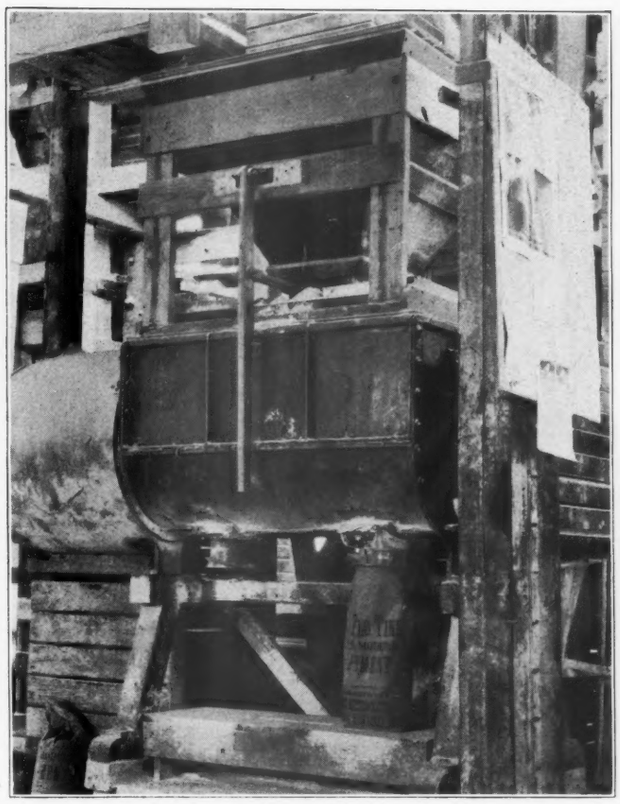


Hoisting a box of rock in the quarry.

and ¼-in. is desired, the material from the hopper is chuted into a pair of Allis-Chalmers crushing rolls with an approximate setting of ½-in. Here the material is reclaimed by another bucket-type elevator on 50-ft. centers and is deposited on a gravity screen 12 ft. long and 20 in. wide. Here the ¼-in. and ⅜-in. are segregated and spouted into storage bins of 60-tons capacity each, ready for shipping.

The tailing or dust from this process of screening is spouted into a 10-in. screw conveyor, 50-ft. in length and discharging into the feed-end of the tube-mills.

If aggregate of the finer sizes are desired—such as ⅛-in., 10- to 30-mesh, 10- to 50-mesh, or 40- to

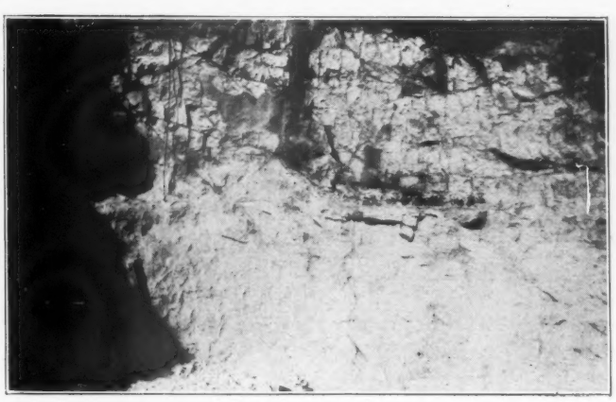


Mixing and sacking machine; note safety bulletin on pillar.

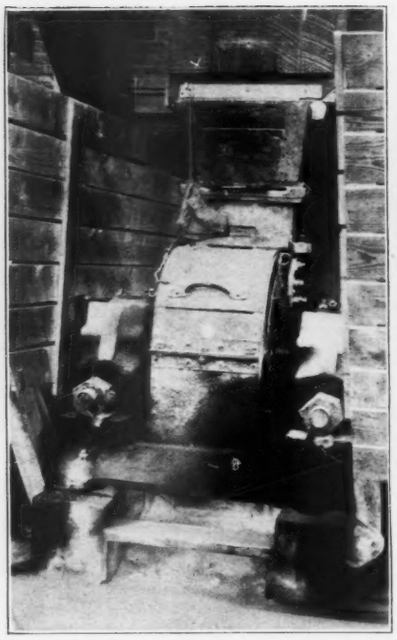
80-mesh—the material from the 15-ton bin is chuted to a pair of Sturtevant No. 1 ring rolls and then sent over the battery of Sturtevant No. 1 Moto-Vibro screens. Beneath these screens are four large steel bins each 11 ft. square with a capacity of 65 tons, or a total capacity of 260 tons in all four bins. They are equipped with steel spouts and valves and located over a loading platform enabling several cars to be loaded at one time.

If the bins containing the coarse ⅜-in. and ¼-in. aggregate are full and the Allis-Chalmers rolls are not running, fine material is furnished to the tube-mills by the Sturtevant ring rolls. Otherwise the 24-in. by 14-in. crushing rolls create sufficient dust to supply the tubes.

Fine grinding or pulverizing in the plant is accomplished with two Bonnot Co. tube-mills. Each mill

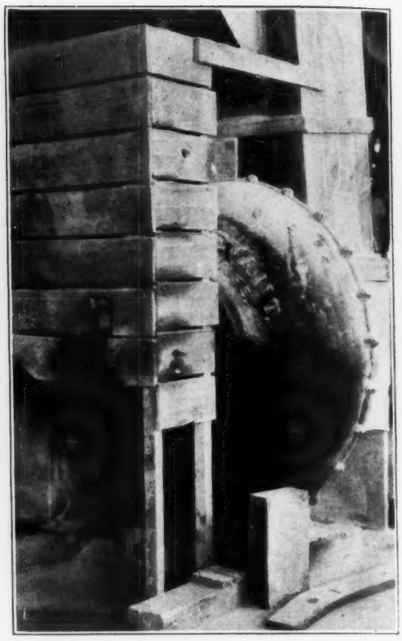


Looking down into quarry.



Roll mill producing fines for the tube mill.

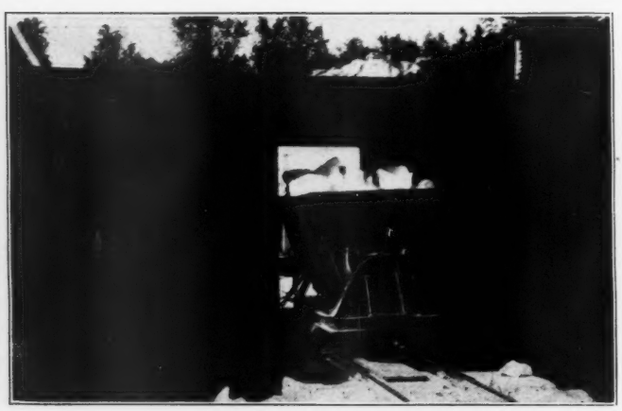
Air separator and sacking machine.



Blower for dust removal from roll mills.

is 22 ft. long and 5 ft. in diameter and driven by a General Electric 100-hp. motor. Both mills are lined with imported Belgian Silex mill linings, and the grinding medium is Danish flint pebbles. Both the linings and pebbles analyze 99 per cent pure silica, so there are no discolorations or addition of impurities as would be the case if the conventional type of roller or ball mills were employed. This type of pulverizing is absolutely required in a material of 20-per cent silica content.

At the discharge end of each tube-mill is a bucket elevator on 40-ft. centers which elevates and deposits the finely pulverized material into the air-flotation system. This system, developed by the company's engineer, consists of a battery of air-separators, constructed by the Raymond Bros. Impact Pulverizer Co. These machines are placed in special arrangement, resulting in an extremely fine, finished pigment, all of which will pass through a standard 325-mesh testing sieve. Other grades of 120-mesh, 200-mesh, and 250-mesh are produced. Beneath the separators and running the entire length of the flotation plant is a 14-in. screw conveyor which claims the coarser material rejected by the separators and returns it to an elevator which delivers it to the first screw for further grinding in the mills.



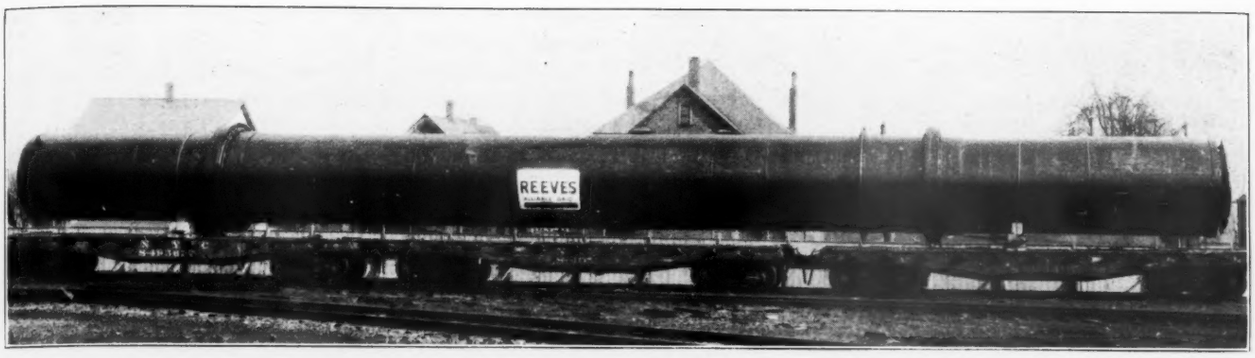
Side-dump loaded car entering a box car.

The plant is remarkably free from dust at all times, due to the efficient system of dust rooms and the fans installed over each grinding machine. The fans provide a suction which catches all fine dust about the machines, thereby keeping the air in first-class condition for all men working in the plant. In addition to keeping the plant atmosphere in wholesome condition, the dust rooms and flumes produce an impalpably fine pigment, which might be called the cream of the plant. This material is used in the manufacture of cosmetics and for high-grade enamel specialties. It is so fine in structure and particle-size that modern science has not produced a screen of sufficient fineness to measure its particles. However, different authorities have estimated its particle-size to be in the neighborhood of 600-mesh.

The Milwaukee plant is completely electrified and rated at 900 hp.

The mines at Felch are under the supervision of Paul Krentz, who is well acquainted with all types of quarry operations. The Milwaukee plant has as its superintendent R. C. Wendt, who has been with the company since its organization some 15 years ago. He has had wide experience in mill work and is experienced in fine grinding.

The Metro-Nite Co. was founded by and is under the active management of Edward Copps of Milwaukee. He is also president and general manager of the Michigan Quartz Silica Co. and is assisted in the management of both firms by the writer. In addition to the above activities, Mr. Copps controls over 7,000 acres of mining, water-power and timber lands in northern Georgia, where he is engaged in opening gold-bearing deposits.



One of the oxwelded lime kilns loaded on three cars for shipment.

Large Rotary Lime Kilns Fabricated by Welding Process Prove Success

Rivetless Construction Stands Up Under Test; Saving in Weight Important Factor

NEARLY seven years ago a lime kiln 8 ft. in diam. and 125 ft. long was fabricated by oxwelding. This kiln was one unit of an order for three kilns but, because this was the first attempt at welding such a large piece of equipment, it was decided to weld only one kiln and to fabricate the two others by the usual riveting procedure.

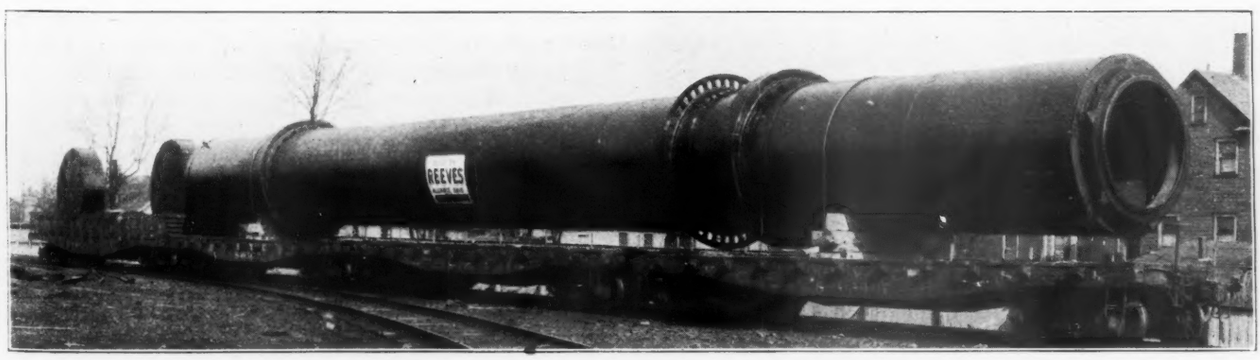
The fact that these kilns were placed in operation at the same time made it possible to obtain some interesting comparisons between the behavior of riveted and oxwelded kilns after they had been in service for some time.

After the kilns had been in operation for about three years, careful tests were made to determine, by means of strain-gauge measurements, the exact stresses that existed in various parts of the kilns under various conditions of load. According to information submitted by the Linde Air Products Co., these tests showed that, while the maximum stress in the kiln shell was only 4,700 lb. per sq. in. under the worst possible condition of loading, measurements made across triple-riveted butt straps in the riveted kilns showed movements from 2 to 2⅓ times the amount existing in the plates immediately alongside.

In the welded kiln there were no such points of excessive movement, and the welded kiln has remained more concentric and straighter than the riveted kilns throughout six years of successful operation.

During the latter part of 1929 bids were issued by the same customer for two additional kilns 9 ft. in diameter by 120 ft. in length with ⅝-in.-wall thickness. Alternate bids were requested on welded and riveted construction. Due to the increased experience of the fabricating shops in handling oxwelded equipment of large size, the bids received for welded construction compared very favorably with those for riveted construction and the contract for both kilns was consequently let for oxwelded construction to the A. G. Reeves Steel Construction Co., Alliance, O.

Each shell consisted of three 30-ft. courses with a 17-ft. course at the feed end, and a 13-ft. course at the discharge end. The 13-ft. course was employed at the discharge end of the kiln because of the



Showing how an assembled large kiln is shipped.

Welding the outside of a girth seam.

greater loading stress encountered at this point.

In the fabrication of these kilns, the requirements of procedure control were followed carefully. Each welder was required to pass a qualification test before he was permitted to do any welding on the kiln. For the qualification test, each welder was required to submit a test weld made in Class A steel plate, having an minimum tensile strength of 54,000 lb. per sq. in., and a maximum carbon content of 0.20 per cent. High-test welding rod was specified. From each test plate, four standard tensile-test coupons were cut, the reinforcements being removed from two of the coupons before testing. The average of the tensile tests submitted by welders who were approved was 55,000 lb. per sq. in.

Specifications for the fabrication of the kiln shells called for the use of single-V welds for the longitudinal seams and double-V welds for the girth seams. Ordinarily, in steel-plate-vessel construction, the longitudinal seams are subjected to greater stress than the girth seams. In rotary kilns, however, the stress to which the shell is subjected results not from internal pressure but from the load of the lining and contents of the kiln which causes the cylindrical shell to act as a beam supported by and overhanging the tires. Consequently in a rotary kiln the girth seams are subjected to the greater stress and, for this reason, double-V welds were specified for these seams. Specifications for the single-V welds used on longitudinal seams required that they be made with an included angle of 90 deg. and finish welded at the bottom of the V.

The plates were laid out so as to provide for the minimum amount of welding and to remove the girth joints from the points of principal stress which occur at the supports. As the diameter of the kilns was 9 ft., three plates were required for each course so that each course contained three longitudinal welds. Preparation of the plates for welding followed the usual procedure that has been developed for such construction. The plates were first squared, beveled for welding on a plate planer, crimped along the longitudinal edges, and then rolled to the proper curvature. In the two 30-ft. courses containing the tires and gear-ring, the plates had to be punched for riveting before rolling, as the usual practice of riveting these connections to the shell was retained.

Note the wedge clamps in the seam.

The kiln rests on rollers while being welded.

The first step in the welding procedure was to fabricate the various courses required. No difficulty was experienced in making the longitudinal seams even on the 30-ft. courses, as previous experience had definitely established that seams of any length may be welded if the proper provision is made for contraction of the seam during welding.

One feature which had not been generally employed prior to this time was the re-rolling of the courses after welding longitudinal seams. This was done in a set of 30 ft. rolls, and entirely satisfactory

results were obtained without heating the plates for re-rolling. The re-rolling of these courses not only facilitated lining up the girth seams but aided in maintaining the straightness and concentricity of the shells.

For making the girth seams the courses were lined up by means of roller supports. When the proper alignment and spacing were obtained and made secure by means of wedge clamps, the courses were tack-welded together to insure correct alignment during welding. The customary practice of staggering longitudinal seams was followed in lining up the courses. The girth seams were welded first from the outside with the operator working at the top of the kiln. As the weld progressed the kiln was turned by means of a chain attached to an overhead crane, so that the welder worked continually in the same relative position. As the weld approached a clamp this was removed or, if necessary, cut out with the blowpipe. Tack-welds were melted out and re-welded in every case. When the outer side of the girth seam had been welded, the inside portion of the double-V weld was made with the operator working from the inside of the kiln at the bottom.

One unusual incident which occurred during the fabrication serves as an excellent illustration of the

Rerolling a course after the long seams were welded.

flexibility of ox-welding as a construction method. During the progress of the work, it was discovered that in the 30-ft. section of each kiln nearest the feed end which contains the gear-ring and tire, the relative positions of gear-ring and tire had been interchanged in laying out the rivet holes. Turning this section end for end would not correct the error as this would not bring the center lines of tire and gear-ring in the correct positions. If riveted construction had been employed for joining the girth

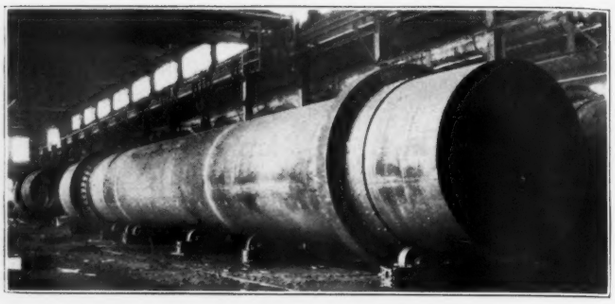
Welding a double-V girth seam.

seams, this entire 30-ft. course on both kilns would necessarily have been replaced with a consequent large additional expense and considerable delay. The delay in this case would probably have been four or five weeks, as these plates would have had to be re-ordered from the mill and put through the necessary forming operations prior to the joining of the sections into the kiln shells. As a result of using the oxy-acetylene process, the difficulty was quickly overcome by cutting a section 5 ft. 4⅛ in. long from the 17-ft. feed-end course and welding this short section in at the opposite end of the 30-ft. course containing the tire and gear-ring. The removal of the short section was accomplished by means of the oxy-acetylene cutting blow-pipe, the cut edges being beveled for welding with pneumatic chipping tools. This section was then welded into the kiln shell in the same manner as the others, necessitating only one additional girth weld in each of the kilns.

Upon completion of the kilns, measurements were taken to determine the concentricity at the feed and discharge ends and the straightness over the entire

Welding one of the girth seams.

Two kilns under construction.



Kiln ready for end courses.

length. The concentricity was determined by rotating the kilns on the tire rings, and the measurements indicated that the kilns would rotate with an eccentricity of only 3/8 in. at one end and 5/8 in. at the other. The straightness of the shell was measured by use of a transit, measurements being taken at eight points along the kiln length and at the quarter points of the circumference. These measurements indicated that the shells were within 5/8 in. of true cylinders.

Successful operation of the first oxwelded kiln for a period of years has proved the suitability of the oxwelded joint for this construction. The fabrication of the two welded kilns just described indicates that the cost of the welded construction is

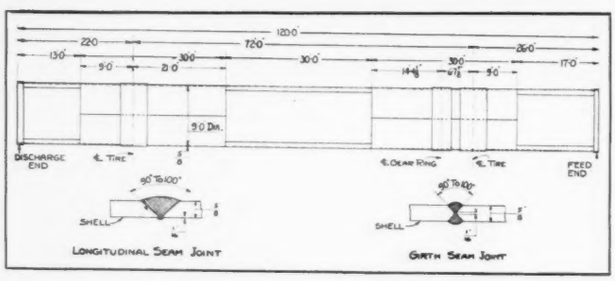


Diagram of sheets and welding joints in a 120-ft. lime kiln.

quite comparable with that of other methods. These facts, together with the advantages offered by oxwelded construction, would indicate the economic desirability of a more extensive use of oxwelded rotary kilns.

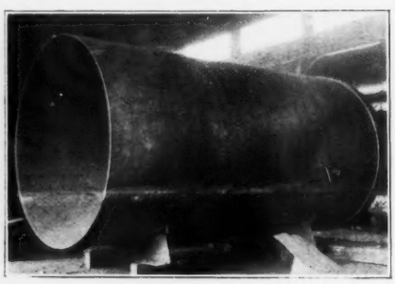
The advantages of oxwelded construction may be emphasized by considering some of the fundamental requirements of kiln design and operation. A rotary kiln acts as a long beam overhanging its two supports and, as the kiln rotates, the stress at any point varies in magnitude from maximum tension to maximum compression for each rotation of the kiln. This continually changing load subjects the shell and joints to constantly alternating stresses and this factor must be taken in consideration, especially in the design of the girth joints. For riveted construction this reversal of stresses tends to loosen up rivets and, consequently, the shell plates must be thick enough to resist the stresses which are tending to loosen up the riveted seams. Since the welded kiln-shell acts as a single homogeneous cylinder, there are no concentrations of stress at the joints, and actual measurements made on the first welded kiln indicate that the shell-plate thickness could be reduced 25 per cent and still maintain a larger factor of safety with the welded design than is obtained with the usual design assumptions employed in riveted-kiln construction. Although, to date, advantage of this saving has not been realized in welded-kiln construction, the continued extensive use and better understanding of welding will certainly warrant its consideration. The reduction in shell thickness which can safely be made by the use of welded construction will materially reduce the weight of the kiln shell and decrease, to a very large extent, the cost of fabrication. Even though the two welded kilns just described employed the same plate thickness as would have been used for riveted construction, a saving in weight of 21,600 lb. was effected on each kiln through the elimination of rivets and butt-straps. This saving in weight represents 28 per cent of the total estimated weight of the corresponding riveted kiln.

Another factor which affects the satisfactory operation of kilns is the straightness of the kiln shell as a cylinder. Experience has shown that welded kilns can be held within much closer limits than those which are riveted. Furthermore, the first welded kiln after several years of operation

(*Continued on Page 34*)

Rolls accommodate 30-ft. courses.

Welding inside a long seam.



One end of kiln completed.

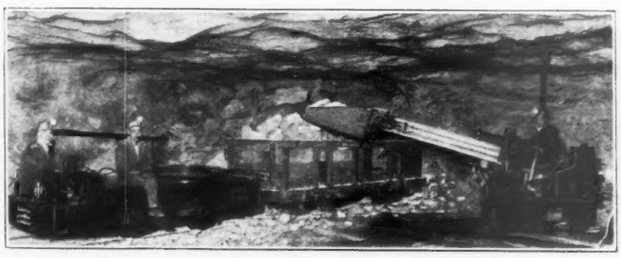
Practices in Winning Rock Salt Resemble Those Employed in Coal Mining*

Manager of New York Company Describes Mining and Preparation of Products

By T. FOSTER COURTHOPE
General Manager, Retsof Mining Co.

FOR ages salt has been considered one of the necessities of life. Scripture records, in the Book of Genesis, a reference to the "Vale of Siddam," now called the Dead Sea, where salt was obtained. Also Job, in a moment of despair, raised the question, "Can that which is unsavory be eaten without salt?" which of course implied a negative answer. Mankind has always voiced an appreciation of this product.

Whence the salt of the earth? Well, some geologists hold that it is of volcanic origin; others, that it is the sedimentary deposit of inland salt lakes which have become separated from the ocean, and this is the generally accepted theory.



Transferring the broken salt rock to mine cars.

The earliest system of producing salt was by the solar process; that is, sea water was impounded and then evaporated by the heat of the sun. This method is feasible in hot, sunny climates, but it has practically fallen into disuse. More efficient ways have been found to obtain the product.

Nature has generously provided the world with salt. There are deposits in practically every country. In the United States salt mines and plants producing evaporated salt are located principally in New York, Michigan, Ohio, Kansas and Louisiana, although deposits are also found in several other states. These resources are so widely distributed that there is practically no possibility of a shortage of this commodity.

Salt is so universally used that we give little thought to the source of supply or to the methods of producing it. Nowadays there are two distinct processes. One involves the mining and preparation of rock salt; the other, the crystallization of salt in solution by the evaporation process.

Rock salt is mined and prepared in practically the same manner as bituminous coal. Evaporated salt is obtained by a different procedure which starts with the drilling of a bore hole down to the salt bed. Drill-rigs, similar to those used by oil producers, are employed for this purpose. Two pipes, one within the other, are extended down the bore hole to the bottom. The larger one serves as a casing as well as to carry fresh water down the bore hole. And the inner pipe carries the return flow of salt brine which is forced up under air pressure to the surface where it is impounded in tanks. After removing the impurities, the brine is boiled down until there remains only the salt which is dried, screened and put into packages for the consumer's

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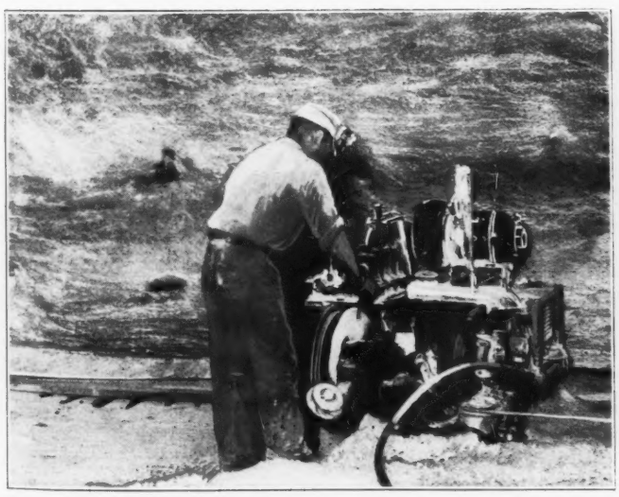


The first operation in this salt mine is to make the undercut with the power-driven machine.

Showing the result of a typical shot made in the Retsof mine. Observe that the rock is well fragmented.

Drilling bore-holes in the salt rock is the second step. A regular round consists of 55 holes.

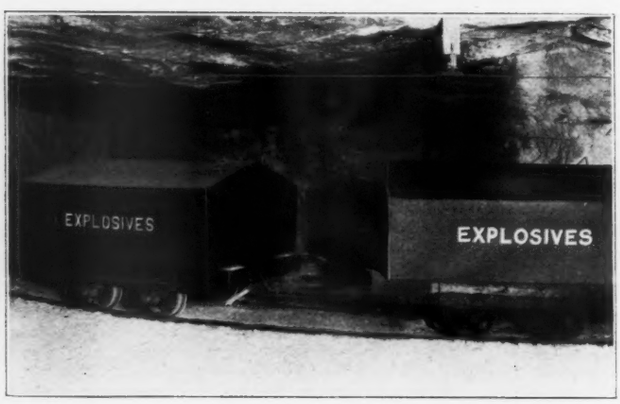
Loading charges of dynamite in the bore-holes is the third operation. Note the long poles the men are using.

use. The detailed steps taken to evaporate and prepare this product for table use are too complicated for discussion here, but the foregoing will suffice to mark the distinction between rock salt and evaporated salt.

The use of rock salt is practically confined to manufacturing processes. Large quantities of it are used for chemicals, acids, explosives, paper, fertilizers, soap, steel and glass; for the setting of dyes; for softening water; for thawing railroad switches in winter, and for freezing ice cream. There are, of course, other uses, but those mentioned will serve to show the importance of the product in our industrial life.

Perhaps it may interest you to know some facts about the largest and most modern rock salt mine that has been developed in recent years—an operation with a capacity of 3,000 tons per day. It is known as the Retsof mine. The property is located at the town of that name in New York State, approximately sixty miles south of Rochester and sixty miles east of Buffalo. It is owned and operated by the International Salt Co., which also maintains evaporating plants at Watkins and Ithaca, N. Y., and mines at Detroit, Mich., and Avery Island, La.

The presence of rock salt in the vicinity of Retsof was first proved by sinking a bore hole in 1883.



These cars are specially made to insure safe transportation of dynamite. Even the couplings are insulated.

Two years later the Retsof Mining Co. was organized and a shaft was sunk to the salt deposit, which was found at a depth of 996 ft. This shaft served continuously for thirty-seven years, or until 1922. At that time the workings were far removed from the original shaft; also the surface buildings and machinery were becoming obsolete, so the management decided to sink a new shaft three-quarters of a mile south of the original one and to build a new plant. This was done.

The new shaft is elliptical in section, measuring 9 ft. wide by 28 ft. long. It is lined with concrete

The bottom of the shaft where the cars are dumped by mechanical means. Each skip has a capacity of 9 tons of rock. Raising this load from the shaft bottom to the top of the breaker building —a distance of about 1,200 ft.—requires only about 55 sec.

from top to bottom and reaches the salt at a depth of 1,073 ft. About 33,800 tons of shale and rock were removed in the excavation and 6,780 cu. yd. of concrete were required for the walls.

The shaft is divided into three compartments, two for the skips and one for the service or man cage. The 1,050-hp. electric hoist is of massive design, and the skips, with a capacity of nine tons each, are raised with 1¾-in. hoisting ropes. To transfer a load from the shaft bottom to the dumping station at the top of the breaker—a distance of approximately 1,200 ft.—requires fifty-five seconds.

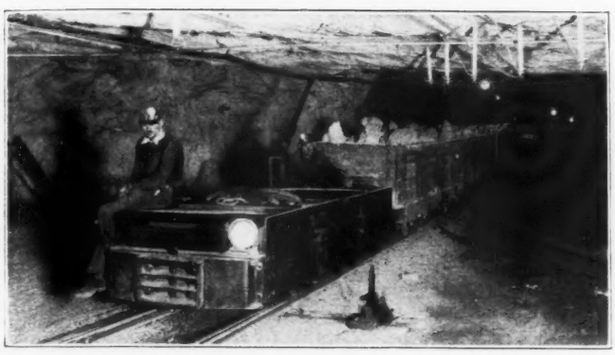
The service elevator is driven by a 200-hp. motor, connected with hoisting ropes of 1¼-in. diameter. The rope speed is 600 ft. per min. Every possible

safety device is provided at both hoists to prevent excessive speed, traveling beyond a prearranged distance, failure of electric current and the possibility of starting in a wrong direction.

Underground Methods

The salt vein is practically level, averages ten feet in thickness, and is worked on the well-known "room-and-pillar method," 63 per cent of the salt being extracted. The gangways and rooms are 50 ft. wide. No timber is used anywhere, for the roof is exceptionally strong. Since there is no gas in the mine, naked lights are used with safety. Again, mine pumps are not necessary, for there is no water to contend with. In short, it is an ideal place from the average mining man's standpoint.

On the way from the shaft bottom to the working faces, one passes through a well-equipped shop

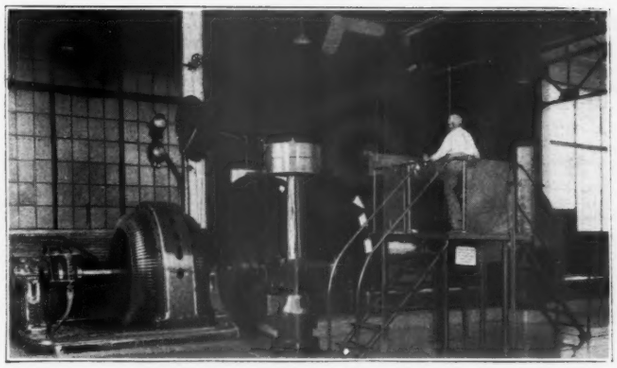


Some of the mine transportation equipment. Electric locomotives haul heavy loads of salt rock over the main line from the working face to the shaft.

where all mining machinery is repaired. The walls and roof are whitewashed, the floor is of concrete and the whole shop is adequately lighted. The temperature in this room is 63° F. the year round, and no artificial heat is necessary at any time of the year to maintain it.

Particular attention has been given to make this shop as efficient as possible. The workmen take pride in the orderly appearance of the place and untidiness is considered a crime. Cigarette butts are conspicuous by their absence, although smoking is allowed.

The mining operations may be classified as undercutting, drilling, blasting, loading and transportation. A detailed description of these operations is not deemed necessary, for they follow closely the best practices employed in up-to-date bituminous coal mines. Salt, however, is much tougher than coal to cut, so the machine speeds and feeds are reduced and the undercutter bits are made of high-grade tool steel.

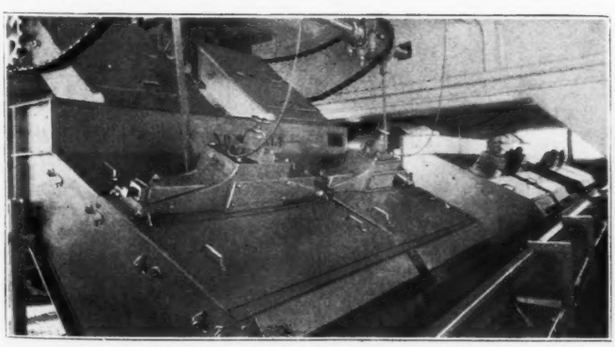


Inside the shaft house, the hoisting engineer may be seen standing on the platform watching the dial indicator as a skip-load of rock salt is being brought up the shaft. Note the large electric motor at the left and the big drum on which the cable is wound.

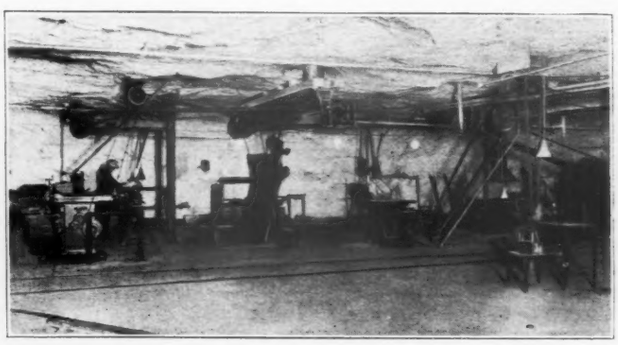
Undercutting—Short wall machines are used. The feed across the face is about 6 in. per min., and the depth of the undercut is 9½ ft. Originally, 6-ft. bars were used but, by gradually increasing their length a foot at a time, it was found that a greater depth was possible without injuring the machine. Eventually, the 10-ft. bar was adopted, giving an effectual depth of undercut of 9½ ft.

Drilling—From fifty to sixty 1½-in. holes are drilled in the salt above the undercut, each hole being from 9 ft. to 10 ft. deep. The position of these holes has been determined by long experience, and drilling is standardized. The machines used are of the rotating, electrically-driven type, the feed being 3 ft. per min.

Blasting—After the drilling machines have been removed, the holes are charged with 1¼-in. by 8-in., 40-per cent du Pont Extra dynamite. All circuits are tested with a galvanometer to see that they are electrically perfect. Blasting is done about 4:35 p. m., after all except the powder men have left the mine. The firing switches are located well out of the danger zone and, before the final "coupling up" takes place, electric current is turned



Part of a battery of 45 vibrating screens used for sizing the salt. By this means the products are prepared in various granulations to meet trade requirements.



Machine and repair shop of the Retsof mine is an attractive place even if it is located hundreds of feet underground. This large, well-lighted room is equipped with modern machinery.

off the mine entirely. One shot in a 50-ft. room produces about 230 tons of salt.

Loading—No hand-loading is done in the mine, all the salt being loaded by Goodman power shovels, of which there are eight in service at the Retsof operation.

Transportation—The tracks are 36-in. gauge, and the mine cars hold 3½ tons. Seven-ton and ten-ton electric locomotives are used on the main haulage roads, and four-ton locomotives for gathering. At the shaft bottom there is adequate trackage for both loaded and empty cars. Unloading is accomplished by means of a pneumatic rotary dump, and the cars are fed to it on an electrically-driven car-haul. The salt rock is crushed in a 30-in. by 42-in. jaw crusher after it leaves the dump and before it is loaded into the skips.

Salt Preparation

The preparation of rock salt for market consists of crushing and screening and, generally speaking, follows closely the method employed by bituminous coal operators.

In building the Retsof Mining Co.'s plant no effort was spared to obtain a group of buildings pleasing in appearance, yet undisguised as to their purpose. In respect to design, construction and equipment, each one is modern and laid out to secure the utmost in operating efficiency.

Orderliness, cleanliness, safe working conditions, and coöperation between men and officials are a few of the ideals striven for by this organization. Its success in business has been earned largely by giving careful attention to a multitude of little details incident to the mining and preparation of its product. All of which brings to mind the sage comment of a famous sculptor, and it is as true in its application to industry as it is to art. Michelangelo said, "Trifles make perfection—but perfection is no trifle."

Kilns Fabricated by Welding

(Continued from page 30)

shows an eccentricity of only ¾ in., whereas the two riveted kilns, which have operated for a similar period, have eccentricities of 1⅛ in. and 2 in.

Since rotary kilns are lined throughout with firebrick, smoothness of the interior of the shell is an important consideration. Because of this requirement, riveted kilns must use outside butt-strap construction, so that the only protrusions on the inside of the shell are the rivet heads. This design reduces the efficiency of the riveted joints. In welded construction the absolutely smooth interior affords ideal conditions for the installation of the lining.

Opportunities exist for further extending the use of oxwelding in kiln construction. Up to the present time, tires and gears have been attached to welded kilns by the usual method employed in riveted construction. It appears logical that, as welded construction is more generally used, the riveting of these attachments will be eliminated and that the tire and gear-rings will be designed so that they can be directly welded into the shell.

From this consideration of the economic factors affecting the construction and operation of rotary kilns, it is evident that oxwelding affords the logical construction method and that, as its advantages are more fully appreciated, oxwelding will become the standard method for the fabrication of rotary kilns.

Final Production Figures Issued on Crushed Stone for 1929

The Department of Commerce has just issued final production figures on crushed stone for 1930.

Total crushed stone amounted to 92,721,260 short tons, valued at $94,387,878 in 1929, an increase of 1.6 per cent in quantity, and of less than 3 per cent in value. Crushed stone for concrete and road work (76,174,770 tons, valued at $80,685,493) increased 2 per cent in quantity, and decreased slightly in value, and crushed stone reported as used for railroad ballast (16,546,490 tons, valued at $13,702,385) decreased 2 per cent in quantity and increased 4 per cent in value.

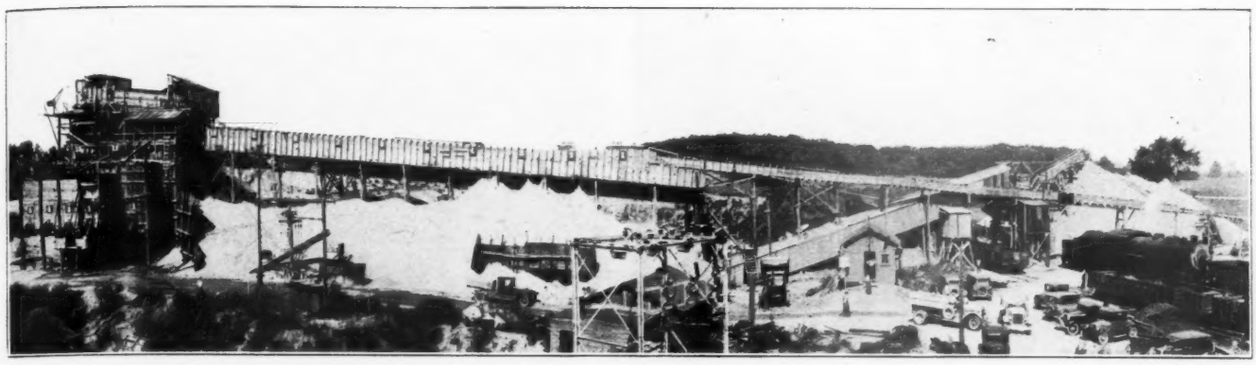
During 1929 the stone sold for fluxing to blast furnaces, open-hearth steel works, smelters, and other metallurgical plants, amounted to 24,393,500 short tons, valued at $18,034,910, an increase of 5 per cent in quantity and 6 per cent in value.

Stone reported for refractory use, which includes dolomite, quartzite, and mica schist, amounted to 1,558,200 short tons, valued at $1,807,324, in 1929, an increase in quantity of 15.5 per cent. Raw dolomite reported as sold for the manufacture of refractories in 1929 amounted to 516,400 short tons, valued at $461,444. Besides this quantity, operators who both quarry and deadburn or sinter dolomite reported 488,032 tons of sintered material, valued at $4,261,942. The quantity of raw dolomite reported was 1 per cent less than in 1928, and the sintered material increased 9 per cent. Quartzite (ganister) used in the manufacture of refractory brick, for furnace lining, and for the manufacture of ferrosilicon, amounted to 1,004,400 short tons, valued at $1,200,634. This was an increase of 3 per cent in quantity. Sales of mica schist for furnace and kiln lining amounted to 37,400 tons, valued at $145,246, an increase in quantity of 10 per cent.

Sales in 1929 of pulverized limestone for agricultural use amounted to 2,654,580 tons, valued at $3,764,775, an increase of 21 per cent in quantity over the sales for 1928.

A. S. T. M. Adopts New Specifications for Various Gypsum Products

Announcement is made by the American Society for Testing Materials of the formal adoption of new specifications and revisions of existing standard specifications for various gypsum products and methods of testing thereof. These include changes in the method of determining the consistency of calcined gypsum. Series of tests were conducted, using various instruments, and the modified Vicat apparatus was found to be the most desirable from the standpoint of accuracy and ease of manipulation. It has, therefore, been adopted as standard



View of plant showing sand flume and stock-piles; car-loading operations on right.

Conglomerate Gravel Compels Producer to Abandon Hydraulic Dredge

Borings Did Not Show Deposit's Nature So a Dragline Has Replaced Old Plant

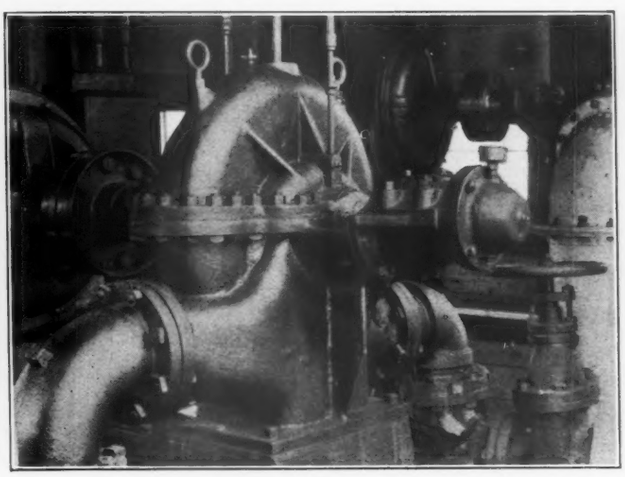
NEWS items from the sand-and-gravel industry announcing the change-over from pit loading to the hydraulic-dredge method of reclaiming raw materials are of frequent occurrence. Announcements of the reverse change are, however, infrequent. This unusual procedure was found necessary by one of Indiana's largest aggregate producers, the Burr Oak Sand & Gravel Co. of Burr Oak, Ind.

Test borings made on the site of the deposit disclosed a total depth of 100 ft. of sand and gravel. The proportion of sand to gravel suggested the use of a hydraulic dredge and, accordingly, a dredge pond was dug and a dredge, equipped with a Morris 12-in. centrifugal pump, was built and floated into position. The suction line was equipped with seven hydraulic nozzles, using a hydraulic pressure of 240 lb., to loosen tightly-packed gravel.

After great difficulty had been encountered even with this equipment, the entire deposit below water-level was pronounced conglomerate. Unfortunately, the test borings had not revealed the deposit as of a conglomerate nature. Further attempts to utilize the dredge proved economically unprofitable. It was necessary, therefore, to abandon the dredge and to substitute another means of reclaiming the gravel deposit above water-level, known to average about 35 ft. in depth. The pump was sold later to another producer, and the pond is now furnishing fresh water for the washing screens.

To reclaim the gravel deposit above water-level, a 1-cu. yd. dragline was installed on a new location, dumping its materials into field conveyors. The rapidly growing business soon necessitated an increased productive capacity and larger size intraplant loading equipment. After considerable study of the possible future expansion of the business, a 3½-cu. yd. dragline was decided upon, and a P&H electric-

The company-designed car puller.



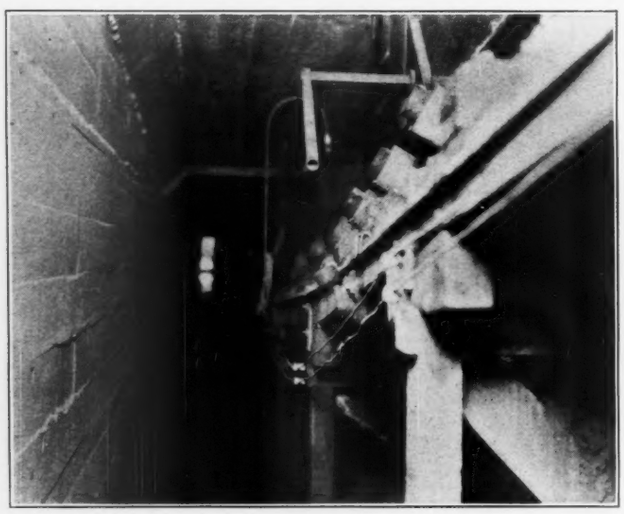
The 6-in. and 10-in. fresh-water pumps.

Car-loading platform and chute.

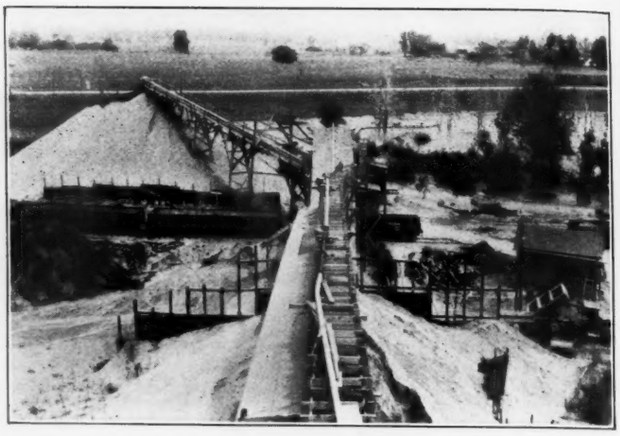
driven unit was installed. To handle the capacity of the new unit, a locomotive and a side-dump car using standard-gauge tracks were installed.

The Burr Oak plant is favored with exceptionally good railroad transportation facilities. Situated on the main line of the Nickel Plate R. R., easy transfer can be made at Hibbard, Ind., which is near by, to the Pennsylvania Lines. The Grand Trunk R. R. is also within easy transfer reach, at Argos, Ind. Freight rates are entirely satisfactory, and a great percentage of the output is shipped to the Chicago market at a very favorable rate. The company owns two side-tracks, each one-half mile in length.

The P&H Model 900, 3½-cu. yd. dragline selected for the loading operation is operated on ground level, extending down into the bank of gravel, and advances in a straight line for the full length of the pit. The bucket is dragged from the floor of the pit, which is the present water-level, up the side of the bank, and its contents are discharged into a J. B. Seavern Co. loading hopper. A Western Wheeled Scraper Co. 16-cu. yd. side-dump car, propelled by a Porter 20-ton locomotive, receives the raw material

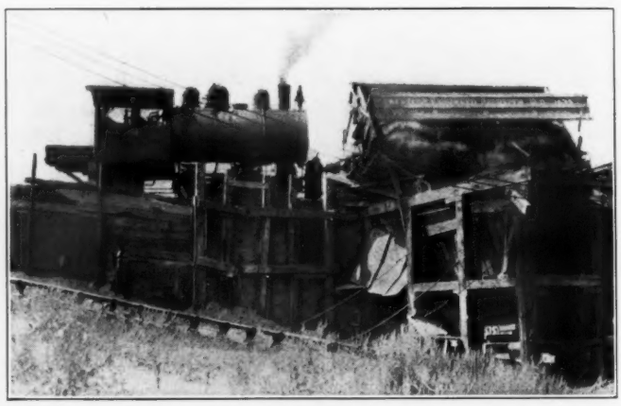


Looking into stock-pile conveyor tunnel.



View of sand flume and gravel stock-pile.

from the hopper and transports it about 200 yd. to the plate feeder at the plant. The Seavern Co. hopper is portable and has a capacity of approximately 50 cu. yd. of material. Three dumping gates permit rapid loading into the Western car. The Porter locomotive and car are operated on ground level over standard-gauge tracks. Not encountering any grades, the equipment operates rapidly and economically with a minimum of expense for track maintenance. As the P&H dragline advances to a



Car dumping raw material into grizzly hopper.

new cut along the pit, the trackage is shifted accordingly to a new convenient position.

Upon reaching the plant, the locomotive and car approach a 14-ft. by 14-ft. grizzly above a hopper located at the side of the track. At this point, the unloading hopper and the plate feeder are installed at the level of an old pit, the grizzly being at the track level. Material from the dumped car flows directly over the grizzly, of steel rails spaced about 5 in. on centers, and into the hopper that supplies the plate feeder beneath. A Telsmith 22-in. plate-feeder, driven by a 3-hp. motor, delivers the material to the first of two conveyors which transport the material to the washing screens. The first conveyor is a 22-in. rubber belt, 101 ft. long, on pulley centers, and is driven by a 25-hp. motor. It discharges to the second conveyor leading to the washing screens. The latter conveyor is a 24-in. rubber belt, 198 ft.

long and is driven by a 40-hp. motor. Robins Conveying Belt Co. pulleys and idlers are used in both conveyors, as well as Boston Woven Hose and Rubber Co. rubber belting.

Before the sand and gravel enter the washing and classifying screens, they pass over a desanding and dewatering screen which is a steel plate 4 ft. by 8 ft. with ⅜-in. perforations. Water is sprayed on the material from a 3-in. pipeline arranged in a zigzag fashion, directly over the down-pouring sand from the conveyor. The sand and water pass through the screen into the sand flume, and the gravel passes directly into the Telsmith 24-ft. washing screen. There are seven sections of screen in use comprising meshes from ⅛-in. to 2½-in. Ma-

Interior of covered walkway along flume. Note valve handles.

terial passing through the ⅜-in. mesh drops directly into the sand flume, while all gravel sizes drop into bins beneath. The washing screen is 5 ft. in diam. and is powered by a 20-hp. motor. It is planned to install paddles on the inside of the screen for additional scrubbing action to insure the absolute removal of clay and shale. A correspondingly larger motor will replace the present power unit.

Water is supplied to the screens by two Morris centrifugal pumps, one a 6-in., the other a 10-in., both mounted on a barge which was constructed from the pontoons of the old dredge and which floats in the former dredge-pond; and by a Morris 4-in. pump located at the shoreline. The washing screens are supplied with 4,200 gal. of water per min.

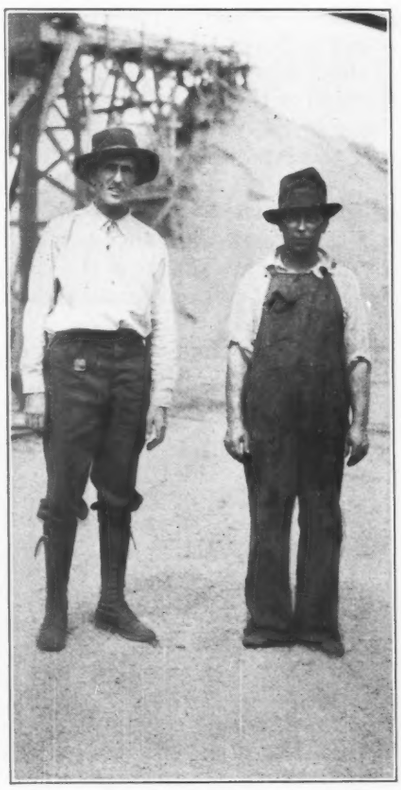
Dragline discharging to loading hopper.

View of pit, dragline, loading hopper, locomotive and car.

through a 10-in. spiral pipeline. The 6-in. and 10-in. pumps are direct-connected to 100-hp. motors.

One of the interesting features of the plant is the method of removing shale from the washed and classified gravel. Picking tables, consisting of two short belt conveyors, one located directly beneath the 2-in. gravel spout from the classifying screen, and the other located beneath the 1-in. spout, are kept wet by a stream of fresh water. The gravel from the washing and classifying screen is spread out on the picking table, which is a 30-in. rubber belt on 8½-ft. pulley centers, and passes to the tail pulley where it is dumped into a bin beneath. Shale flakes, coming into contact with the wet belt, adhere to it and are removed by a scraper located on the under or return side of the belt. Several tons of shale are removed by this method every day. The tables are operated without attention and, in the event of a heavy run of shale, pickers can be employed to remove it by hand. Several 100-watt lamps are installed over each table to provide sufficient light when hand-picking becomes necessary. A 1-hp. motor serves to drive both picking tables.

Oversize gravel from the classifying screen is chuted to a steel hopper that feeds a Telsmith No. 6A primary crusher which is set for



W. K. Behler, office manager, and Ernest Overmeyer, superintendent.

A morning shipment of washed sand and gravel.

Plant view showing old pit in foreground.

2-in. breakage. A 20-hp. motor supplies its power. The Smith company furnished also the crushed-gravel return elevator. This is a 16-in. belt fitted with steel buckets, 47 ft. in length, discharging directly to the main raw-material conveyor. It is driven by a 7½-hp. motor.

An observer viewing the plant will immediately notice the long sand flume and the extensive stock-piles of various grades of sand beneath. The Burr Oak company has used the flume method for sand gradation for many years, obtaining as many as eleven grades in eleven stock-piles below the flume which is 154 ft. long. The flume is approximately 3 ft. wide and 5 ft. deep and has baffles placed every 14 ft., making eleven settling pockets. To each settling pocket, an average of 28 sand valves have been installed—permitting the sand to dribble out. The valves are set four in a row with seven rows to a pocket. A hand lever simultaneously operates the rotary gates of the four valves in each row. Control of the valves is made from a covered walkway along the side of the flume. To prevent stray gravel from clogging the valves, a protecting screen is mounted over the top of the baffles, extending the full length of the flume and allowing the gravel to be carried off into the waste-water pond.

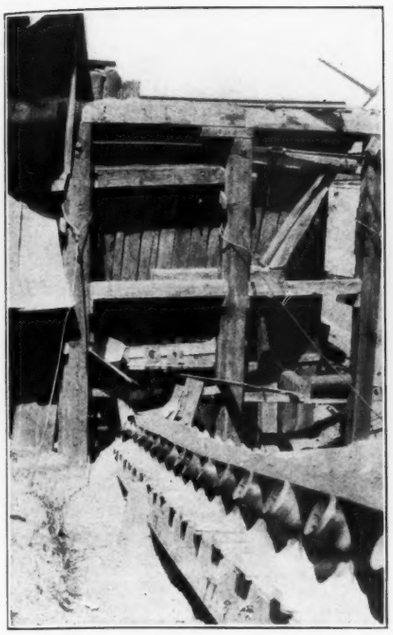
While it is possible to obtain eleven grades of sand, actual sales are made on the basis of three grades. Four bins of fines are used for plaster and masons' sand, six bins for torpedo and railroad sand, and one bin for coarse sand. The feature of the system is the wide range of grades to meet the customer's needs. Any combination of grades can be delivered from the tunnel conveyor located under the stock-piles.

Methods of handling the finished product at this plant are both modern and practical. A 202-ft. tunnel, 10 ft. wide by 7 ft. high, extends underneath the gravel bins and sand stock-piles with access to every grade of gravel and sand. Each bin or stock-pile has a dumping gate, discharging to a 36-in. belt conveyor, 300 ft. long, extending out to the car-loading platform. Robins Conveying Belt Co. equipment is used in this conveyor, and a 60-hp. motor is used for its power. Remote control from the car-loading platform is another convenience of great advantage to the operator. A final washing is given to the gravel from a jet as the material is discharged into the awaiting car.

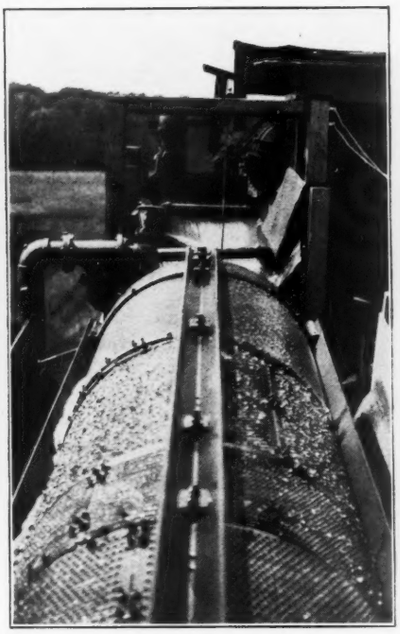
Picking table for removing shale from washed gravel.

Stock-pile loader with batch attachment.

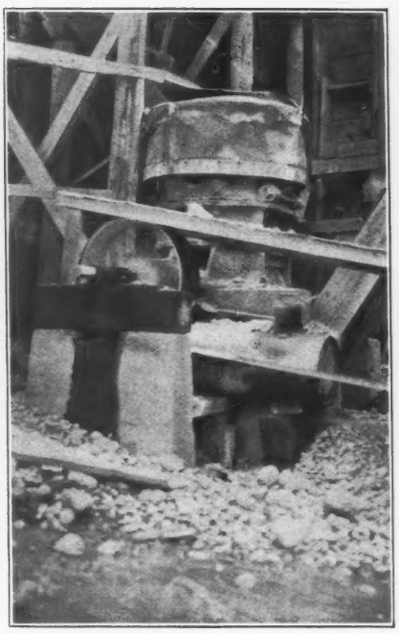
A large gravel stock-pile has been placed near the company side-tracks for the purpose of storing excess gravel in periods of light shipments. An overhead conveyor, receiving gravel from the car-loading platform, transfers it to the stock-pile. This conveyor, of Barber-Greene make, uses an 18-in. belt, 75 ft. on pulley centers. A 7½-hp. motor with a chain drive is the power unit. A Barber-Greene



Grizzly hopper with plate feeder beneath feed conveyor.



Dewatering and desanding screen. Revolving screen in foreground.



Gyratory crusher and return elevator in plant.

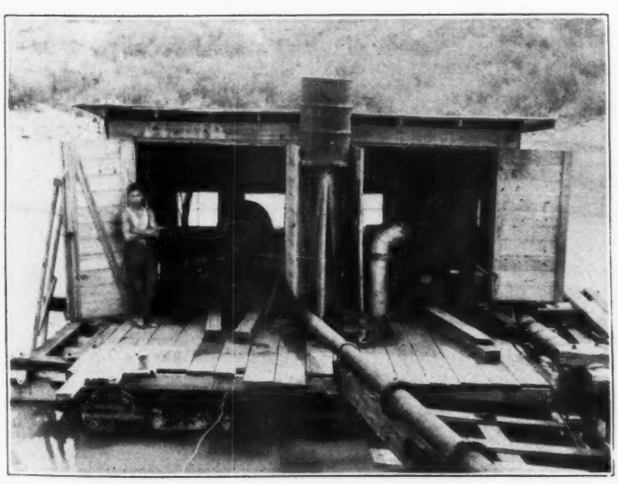
loader, fitted with a batch-box, is used to reclaim the gravel and to load it into awaiting trucks.

Three bins of gravel located beneath the washing screen are used for normal stock. Each bin is fitted with a dumping gate for truck loading, in addition to the tunnel-handling equipment for loading cars. The total capacity of the bins, when filled, is approximately 40 cars.

An interesting adaptation of a Model T Ford is found in the car-puller mechanism in use at this plant. The automobile was dissembled, use being made of only the motor and the gear-shift transmission. An old winch was geared to the drive-shaft of the Ford, and a tank of water substituted for the radiator. While not a handsome contrivance, the employees claim great service from it.

In addition to the office at the plant, the company maintains a Chicago office as a division of the E. A. Keappler Co., 16 South Jefferson St. Mr. Keappler is the proprietor of the company, and is assisted by W. K. Behler, office manager at Burr Oak, Ind., and Ernest Overmeyer, superintendent in charge of production. Sixteen men constitute the present working force, producing an average of 30 cars of finished material per day.

The proximity of this pit and plant to the metropolitan and industrial areas that center about Chicago, Ill., and Gary, Ind., gives the Burr Oak Sand & Gravel Co. assurance of a continued large market for its various standardized grades of washed aggregates for construction purposes.



View of barge showing 6-in. and 10-in. pumps.

The Lithology of Glacial Deposits

The accompanying cut was omitted by mistake from the excellent article by Prof. Harold O. Whitnall published in the Sept. 10 issue of PIT AND QUARRY. Reference to this diagram is made on page 36 of that issue.

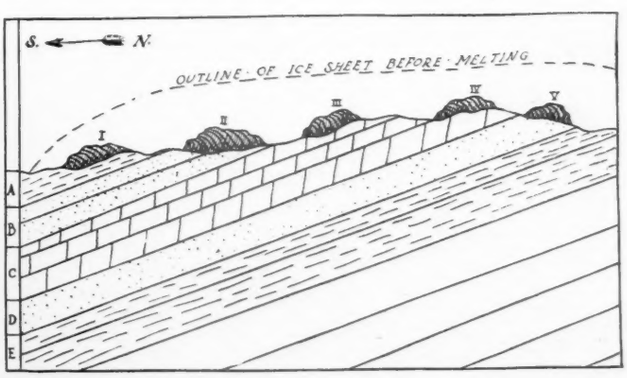


Fig. 8. Diagram illustrating how successive moraines have their composition determined by the character of the underlying strata—highly generalized.

The blast. Quarry face is just beginning to roll.

Quarry Blast in Chicago Suburb Brings Down 24,000 Cu. Yd. of Stone

After the blast. Note absence of slabs.

Left to right: R. W. Yauch, supt.; E. T. Lednum; A. J. Schoemaker; Mike Glusec; Nick Vukovich; Geo. Bozich, drill foreman; S. R. Russell, explosives expert; and C. J. O'Neill.

THE Brownell Improvement Co., at Thornton, Ill., on Saturday, Sept. 6, at 4:20 p. m. set off the first of a series of three blasts which will keep the plant supplied with stone for several months to come. This blast brought down an estimated 24,000 cu. yd. of stone and the others will be approximately the same size. They will be shot at intervals of about a week.

The face being worked is on the second level of the quarry about 85 ft. below the surface of the ground. It is about 25 ft. in height by 1,200 ft. long and faces north. Holes were drilled with 4 Loomis Clipper wagon-type electric well drills with 6-in. bits.

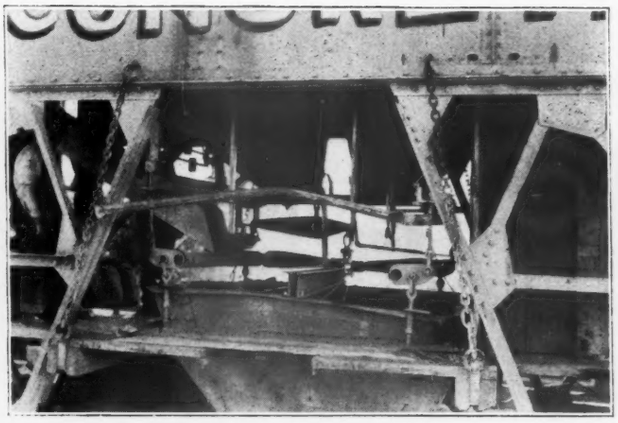
About 400 ft. of this face was shot down by the first blast which consisted of 133 holes in 3 rows spaced 12 ft. between rows and 10-ft. centers. The holes averaged about 26 ft. deep and the charge consisted of 125 lb. of dynamite in one charge at the bottom of each hole. Three hundred and thirty cases of Du Pont Special Gelatin 60 per cent dynamite were used. Detonation was through 36-ft. electric exploders connected in series parallel. Electric power at 440 volts 3 phase, from a nearby power line, was used, contact being made by a special switch. All holes were double-capped to insure against misfires.

The stone was well broken up as can be seen from the accompanying photographs, and very little secondary blasting will be necessary. R. W. Yauch, quarry foreman, estimates that one of the 3½-cu. yd. Bucyrus-Erie shovels can dig into this pile at the rate of 150 t.p.h.

George Bozich, drill foreman, who was in charge of the blast, has had many years of experience in

(*Continued on page 60*)

Truck in position for loading.



Working platform showing batch hoppers.

Sioux City Ready-Mixed Concrete Plant Was Built for Winter Service

Aggregate Hoppers Are Steam-Heated And Mixer Drum Has Oil-Burning Jets

SIOUX CITY, western Iowa's thriving city, prides itself in the ready-mixed concrete plant of the L. G. Everist Co. For many years the Everist company has served this large territory with building materials, sand and gravel, as well as crushed stone, operating its own sand-and-gravel pit at Hawarden, Ia., and a crushed-stone plant at Dell Rapids, Ia. Realizing the market possibilities for ready-mixed concrete, and its own excellent position for extending this service, a new central-mixing plant was planned and built in the company's yards in the spring of 1929.

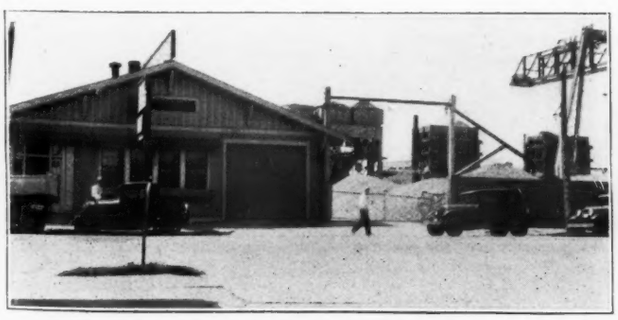
The new unit was built as an additional service. Service, therefore, was the keynote of the design and, accordingly, it is equipped to operate day or night, winter or summer.

Concrete can be mixed in the winter months and loaded into the trucks at an average temperature of 75 degrees.

The "heat treatment" of the concrete is one of the interesting features of the plant. An A. B. Farquar, York, Pa., portable boiler was converted into a stationary boiler. Live steam at a pressure of 50 lb. to 60 lb. is fed into the sand and gravel hopper through a ¾-in. pipe which enters at the bottom and extends upward into the material. Small drilled holes in the pipe act as jets. Provision has been made to protect the water supply from freezing. The riser to the batching platform is insulated and protected by means of a wooden covering. A water heater, consisting of a steam-coil-tank element is used to heat the water to a temperature of 180 deg.

With small orders requiring short periods of operating the plant, it would not pay to fire up the steam boiler. For these periods an oil-jet burner was installed, with the mixer jet entering the mixer drum through a hole in the skip entrance chute. The flame is directed downward in the drum and serves satisfactorily in keeping the mixed concrete at the desired temperature. The oil burner is an Aeroil unit operating from a portable Ingersoll-Rand compressor which supplies the compressed air for the jet. A small storage tank of oil distillate is suspended from the steel framework.

A sand-and-gravel pit or yard has always been considered the ideal location of a ready-mixed concrete plant. This contention is well demonstrated



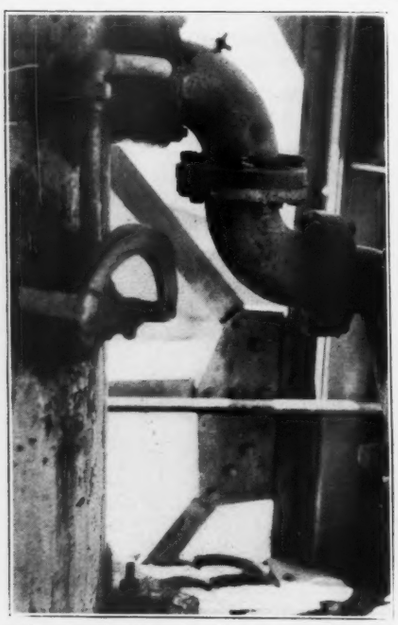
General office, ready-mix plant in rear.

Bag warehouse and cement storage.

Mixing plant in operation, gantry crane in background.

in the Everist company instance. Not only is there assurance of a permanent supply of raw materials, but much of the equipment of the sand-and-gravel yard can be utilized in the ready-mixed plant.

A large yard for sand, gravel, and crushed-stone stockpiles has always been maintained for truck delivery to contractors. The gantry crane not only serves the sand-and-gravel business but also loads the hoppers of the ready-mixed plant. No additional side tracks were required as sufficient trackage was already in use for car unloading.



Water-control tank showing calibrated dial and lever.

The yard stockpile capacity is exceptionally large, being able to stock 25 cars of sand, 25 cars of gravel, and 20 cars of crushed stone. As previously stated, these materials are produced at the company's own plants. (See PIT AND QUARRY, July 4, 1928, issue.) They are unloaded from the cars by means of a 2-cu. yd. clamshell bucket operated from the gantry bridge. The crane was fabricated from Link-Belt and Brown Hoist equipment.

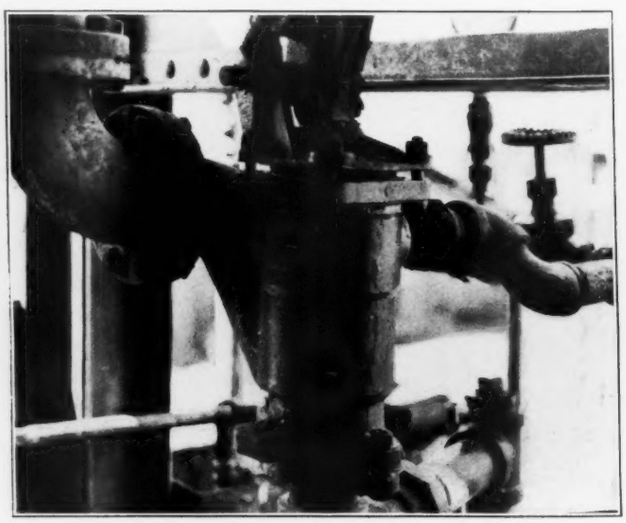
Cement-unloading platform, showing elevator to batch hopper.

At present cement is handled in bags, purchased in carload quantities. A special unloading platform has been built permitting the bags to be trucked out of the cars on hand trucks. A belt conveyor elevates the bags to the batching platform, where they are opened and emptied into the batching hopper. The conveyor is equipped with a Goodyear 24-in. rubber belt on 30-ft. pulley center. It is powered by a General Electric 5-hp. motor.

The mixing plant operates on the gravity principle. From the hoppers the material flows by gravity through the batchers, into the mixer and, finally, into awaiting trucks.

Two Butler Bin Co. hoppers are used, one for sand, the second for gravel, and a Blaw-Knox cylindrical hopper for crushed stone. The capacity of the sand and gravel hoppers is 40 tons each, and the capacity of the crushed-stone hopper is 35 tons. The three hoppers discharge into the batching hopper, and are controlled by lever-operated dumping gates.

The batching hopper is also a Butler Bin Co. product. It is designed for a 2-cu. yd. mixer, and is equipped with a Fairbanks-Morse 2-beam scale, one beam being used for each aggregate. The dumping gate discharges directly below into the mixer.

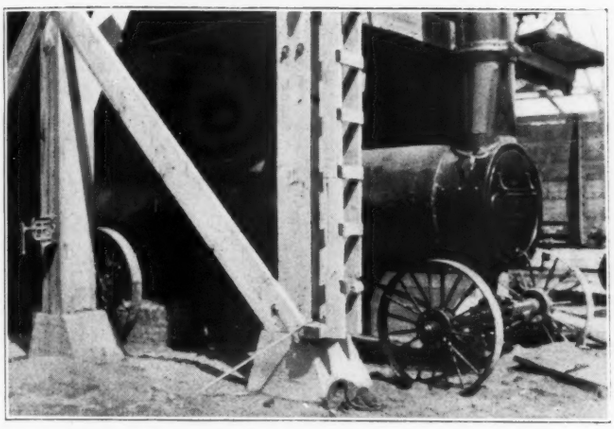


Water supply and siphon valve.

Stock-piles, crane and office in background.

Cement, as previously stated, is conveyed to the batching platform in bags, which are emptied by hand into the batching hopper.

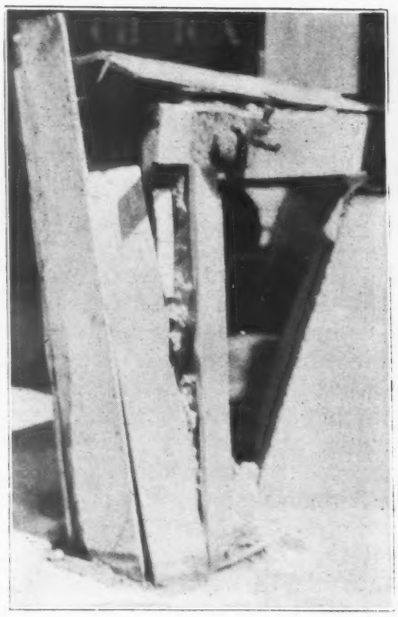
A bulk-cement storage hopper and batching equipment will be installed in the near future, according



Steam supply for winter frost protection.

to present plans. Considerable economy will result in the saving of the sacking charges and the necessary accounting for them, as well as in the saving of time required in handling and opening the bags.

The water content of each batch is controlled by a Koehring 100-gal. volumetric siphon tank. A pair of gauge-glasses calibrated in 5-gal. units, is visible to the operator, who controls the flow by means of an extended lever - operated valve. The water is actually siphoned out of the tank through the opened valve. When the valve is closed, fresh water automatically fills the tank. A special check valve, on the head of the tank, permits the entrance of air when the tank is siphoned and permits the escape of air when being filled.



Water supply to batcher insulated for winter service.

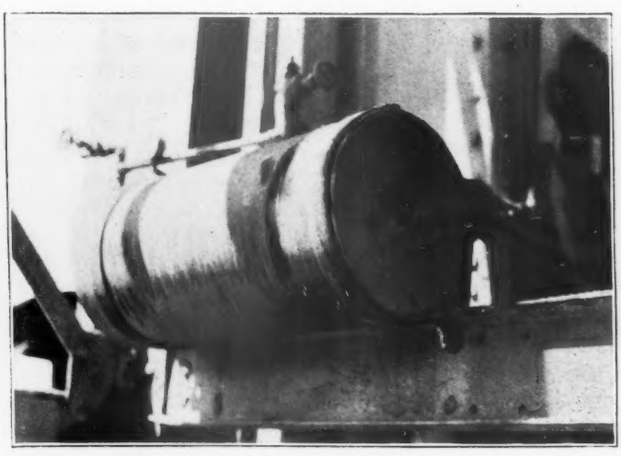
The mixer is located beneath the batching equipment and is in position to dump readily to the awaiting trucks. It is a Ransome, 2-cu. yd. gear-driven mixer, powered by General Electric 50-hp. motor through a Link-Belt chain drive. Discharge is made through a lever-operated trough. The mixer drum is operated at a speed of 200-ft. per min.

The fleet of delivery trucks include five International 2½-ton trucks, one International 1-ton truck, one Packard 7-ton truck, and one Graham Bros. 1-ton truck. All trucks are equipped with Wood bathtub-type bodies with Wood hydraulic hoists.

The sale of concrete is made on a strength-test basis. A 2,500-lb.-per-sq. in. guarantee mix will average 3,000-lb.-per-sq. in. on test. Daily moisture test of aggregates are made to insure accurate water-content control. Various proportions of aggregates can be mixed at the plant, and any type aggregate can be furnished.

Officers of the company include H. H. Everist, president; H. C. Boswell, secretary-treasurer; and A. M. Jensen, engineer in charge of production.

Oil-burner nozzle entrance to mixer drum.



Oil-distillate tank.

What the Paleozoic Submergences Did for Illinois and the Middle West*

By DR. M. M. LEIGHTON
Chief, Illinois State Geological Survey, Urbana, Ill.

THE student of earth history fully approves of the masterpiece of sculpture that stands at the head of the Midway, on Chicago's great south side, which represents Lorado Taft's philosophy of Father Time. There Father Time is depicted as watching the passing of the older generations of humanity and the appearing of the new. Humanity passes but time remains.

The same may be said of the great events of earth history. Mountain ranges and continents pass away but time remains. The mineral treasures of the earth and the mineral necessities which are so fundamental to our present civilization of power, transportation, communication, creative production, human happiness and well-being, are the vestiges and the records of events and conditions now past.

The accompanying address, although prepared especially for a Midwestern audience, contains geologic information that applies to the major portion of our country's expanse.

This discussion emphasizes the fact that most of the non-metallic mineral resources of the great industrial, central states occur within sedimentary measures.

The author, eminent in his profession, is the head of what is said to be the most active state geological survey. He is chairman of the Mineral Industries Committee of the Century of Progress, Chicago's World's Fair of 1933.—Editor.

From the procession of events of which we have record since the origin of the earth and its attainment of mature size, I wish to withdraw one group for our consideration, namely, the succession of Paleozoic submergences, which have given Illinois much of its mineral wealth.

In 1927, Illinois produced 180 million dollars' worth of mineral products, Indiana 108 millions, Iowa 33 millions, Missouri 76 millions, Wisconsin 21 millions, Minnesota 103 millions, and Michigan 124 millions, totaling for these mid-western states—most of which are not thought of as mineral states—646 millions of dollars. Nearly one-half of this value of production is drawn from Paleozoic strata and, in Illinois, considerably more than one-half of its total.

As you are aware, geologists subdivide Earth History into five great eras whose total duration is reckoned as about two billions of years. The first two eras, the Archeozoic and the Proterozoic, consumed about 1,400,000,000 years; the third era, the Paleozoic, about 400,000,000 years; the fourth era, the Mesozoic, about 150,000,000 years; and the fifth era, the Cenozoic, about 50,000,000 years, which brings us down to the present.

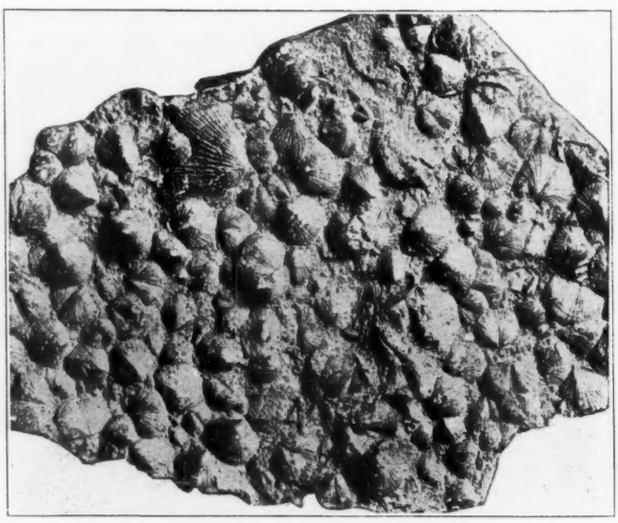
The Paleozoic era was one of repeated submergences of the continents, marine for the greater part of the era, coal-bogs in the latter part. In Illinois and over most of the adjacent states, the layers of limestone and other sedimentary strata that we see in the valley bluffs and in quarries belong mainly to this era.

The first sedimentary system of strata of the Paleozoic group represents what geologists call the Cambrian Period, the next system the Ordovician Period, the third the Silurian Period, the fourth the Devonian Period, the fifth the Mississippian Period, the sixth the Pennsylvanian Period, and the seventh the Permian Period.

Character of Surface

Previous to the Paleozoic Era there had been much sedimentation, vulcanism, mountain folding and metamorphism. This was followed by prolonged erosion so that the mountain ranges of the time were wasted away, reduced and razed. The land surface thus became a low-lying plain, and the soils were those kinds derived mainly from crystalline rocks. The Rocky Mountains and other present lofty mountains were not then in existence; as they stand now, they are much later, even much later than the Paleozoic era.

A view of a vertical cross-section of the strata in Arizona as seen in the walls of the picturesque



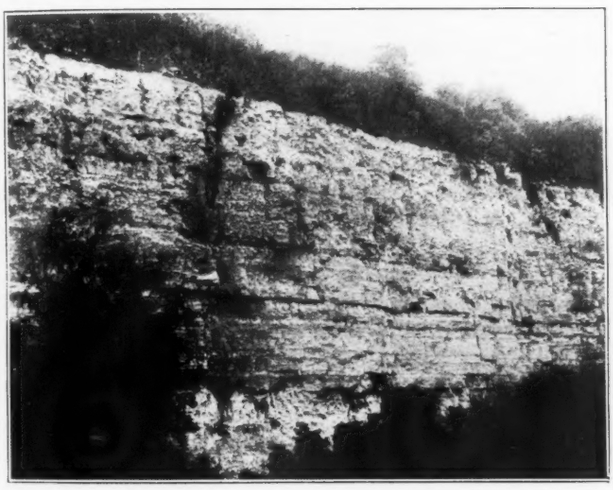
Marine limestone made up mostly of shells.

* Presented before the Mineral Industries Division of the Western Society of Engineers, Chicago, Sept. 2, 1930.

Grand Canyon, will give a fairly correct conception of the position which Paleozoic strata bear to the old crystalline rocks and the nature of the old land surface which was transgressed by the early Paleozoic seas. The Paleozoic strata lie nearly horizontal in the upper part of the Canyon's walls, the pre-Paleozoic rocks, massive and crystalline in character, lie under them, and the nearly level contact between them is the old land surface which had become a lowland, gently undulating, from prolonged weathering and erosion by atmospheric agencies and streams.

What do we know about the basement rocks upon which the Paleozoic System of Illinois rests? A recently drilled well in northern Illinois, near Amboy, reached a total depth of 3,772 ft., and passed mainly through Paleozoic strata to a level where pre-Paleozoic red granite was encountered, at a depth of 3760 feet. A well at St. Louis encountered granite at a depth of 3803 feet. In the Missouri Ozarks where uplift has occurred, the Paleozoic strata have been stripped off by erosion and the older crystallines are exposed. The same is true in

Silurian limestone bluffs north of Savanna, Ill.



Shakopee dolomite near Utica, Ill.

northern Wisconsin, Minnesota, northwestern Iowa, and in the Smoky Mountains of North Carolina.

And so it seems likely that if Illinois had been uplifted to a high plateau in late geological history, like the Colorado plateau, and a canyon had been cut across it like the Grand Canyon, we would see much the same relations of the Paleozoic strata to the older crystalline rock mass as we see in the Grand Canyon. The layered character of Paleozoic formations and their varying resistance to erosion would give the masonry and terraced effect now so beautifully and impressively portrayed in the upper walls of the great Canyon.

Nature of Inundating Seas

There is considerable misconception among laymen regarding the nature of the Paleozoic inundating seas. Some think of the seas that covered parts of this continent as abysmal oceans whereas they were relatively shallow; some picture the submergences as having covered most or all of the continent at one time, whereas they were embayments upon the continent, large enough to cover many states, but by no means the entire continent.

The succession of marine invasions has been given a great deal of study by geologists and much is now known about them. However, space will not permit me to review the shore-line positions of the various Paleozoic seas, but I invite your attention to the nature of some of the sediments that were laid down in the different seas, during the different periods and to their economic values.

The sediments were obtained partly from wave-cutting along the shores, partly from the streams which flowed into the seas, bringing mechanical and chemical sediments, and partly from the myriad forms of life that lived in the marine waters and secreted shells and other hard parts. These sediments were subject to the attrition of storm waves and undertow wherever they were within reach, but eventually they were spread out on the slightly deeper spread sea-floor and buried by subsequent layers of sediment.

The sediments that were spread over some of the ocean floors were sands in great quantity, the sand grains of some epochs being rounded either by water or by wind, while they were being blown about into dunes on the seashore. Some of the layers, now hardened into sandstone, show ripple-marked surfaces as clearly as wave marks on shelving ocean beds today.

Other ocean floors were literally spread with shells, corals, crinoid cups, arms, and stems, and tests of other clear water-loving forms. Some limestone formations hundreds of feet in thickness are dominantly made up of such materials. Obviously a study of these forms reveals the kinds of life that lived at the time.

The lime and magnesia carbonate of these forma-

Round sand-grains of quartz.

tions were carried into the seas by streams from land areas where the carbonates had been taken into solution by the waters which had absorbed carbon dioxide from the atmosphere. Were it not for the fact that volcanos are our primary source of carbon dioxide and water vapor, and that there have been volcanic epochs throughout the earth's history, there would be no weathering, no erosion, no soils, no sedimentation, no life as we know it today. There is horror in volcanic eruptions to some people, but in reality they are responsible for the existence of the atmosphere. The atmosphere is the daughter of the earth.

Resources of Cambrian Rocks

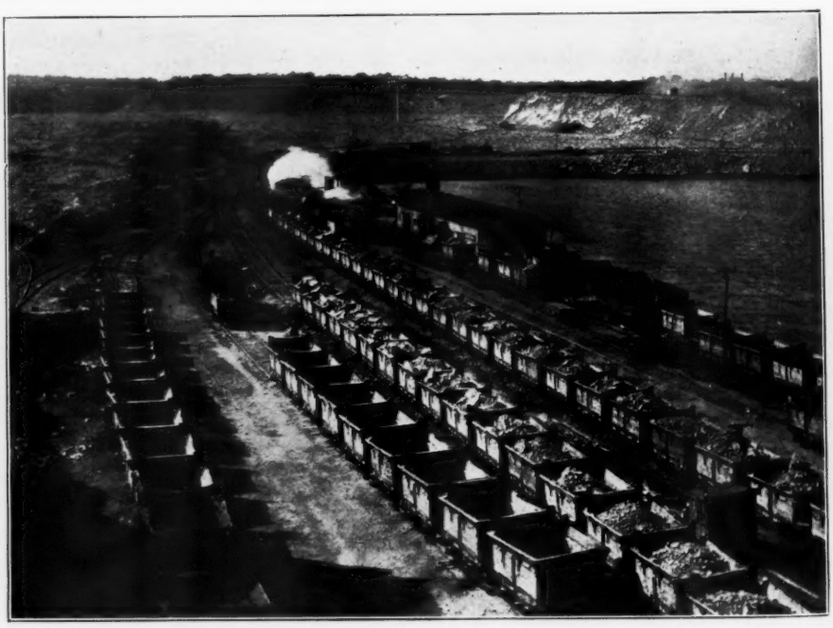
The mineral resources of Illinois first began to be formed in late Cambrian times when the embankment from the South encroached and submerged the old crystalline complex never to be uncovered since.

The sediments that were deposited were mainly sands, having a thickness in excess of 1,500 feet, with a minor quantity of silt and mud and layers of lime and lime-magnesia carbonate. There is only one place in Illinois where these strata can be seen—a secluded spot near Oregon, Ill., where they have been faulted up; elsewhere they are buried by the formations of later age. Some of the sandstone strata, however, may be seen at the dells of the Wisconsin River and from there on north to Grand Rapids and west to the Mississippi River.

The buried position of the Cambrian strata in Illinois makes them of enormous economic value for the waters which they gather in their outcrop area in Wisconsin, furnish the artesian supplies to many municipalities and industries in northern Illinois.

During the Ordovician Period several sea invasions inundated the Middle West, covering all of Illinois and depositing several rock formations of great economic importance to the state. At Utica the Shakopee dolomite, the product of a warm, clear sea, has been a source of hydraulic-cement materials since 1838 when James Clark of Utica established the first plant here and the third in the United States. From 1888, the first year for which we have statistics, to 1906, the average annual production had a value close to $200,000 per year, or a total value of about $3,500,000. In 1900, the Portland-cement plants, using another limestone formation to be referred to later, got under way and since then their production has overshadowed that of natural cement, which has continued, however, to the present, though in a small way.

The deposition of the Shakopee dolomite was brought to a close by uplift, sea retreat, and widespread erosion. The La Salle anticline, as shown by Dr. G. E. Ekblaw and L. E. Workman of my staff, was folded first at this time, and during the erosional period that followed, the Shakopee dolomite and other lower strata were stripped from the axis of the fold. This land-epoch was a long one, perhaps a million years. Finally the land was lowered



One of the large quarries in the Chicago district.

relative to sea-level and another sea came in, which deposited the St. Peter sandstone, and which has become the source of the nationally-known silica-sand industry in the Ottawa, Wedron and Oregon areas. Tourists in the Illinois valley are attracted by this formation which forms Starved Rock and can be seen in the canyons and glens east of the Park, and by the immensity of the quarrying operations from Utica to Ottumwa. The sand in most of the quarries is over 99 per cent pure silica, is well rounded and loosely cemented so that it is readily and cheaply washed down from the quarry faces.

Hydraulicking in St. Peters sandstone.

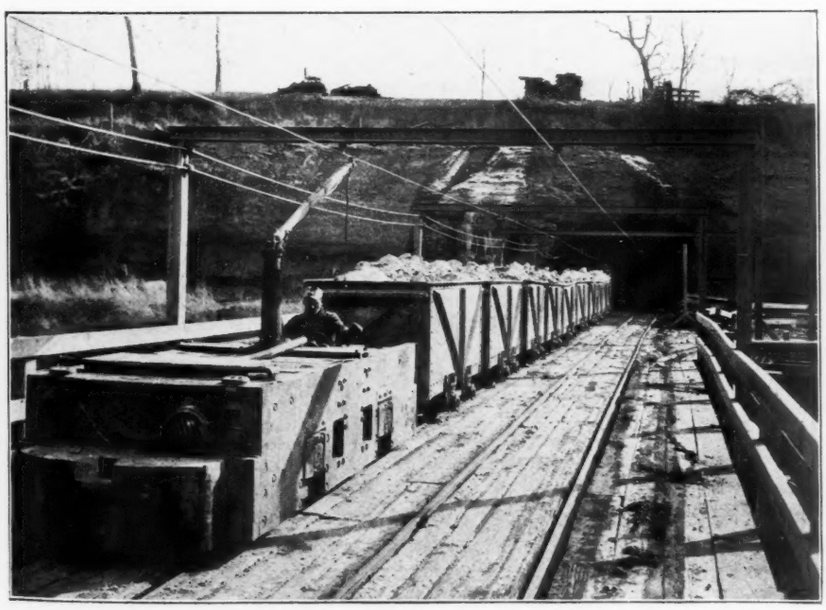
Two classes of silica sand are produced—washed and crude. The washed sand is white and finds a ready market in the manufacture of plate glass, plastering and sand-finishing walls, stone cutting, grinding purposes, sand blasting, filter sand, manufacture of sodium silicate, and other uses. It is this sand that has come to be known as Standard Ottawa which is carefully standardized in size and used throughout the entire country for cement-testing. When ground to a fine powder it is known as ground quartz as well as silica, and is sold for use in making scouring soaps, as a paint filler, and as an inert mineral filler. The unwashed sand is used extensively in steel molding and as fire and furnace sand.

In 1927 this highly refined formation of Nature gave Illinois first place in the nation as the largest producer of silica sand. The industry began prior to 1870 and has probably yielded over 40 million dollars' worth of this exceptionally pure sand.

Enormous reserves, the high quality of the product and the efficiency of the producers make the future very bright.

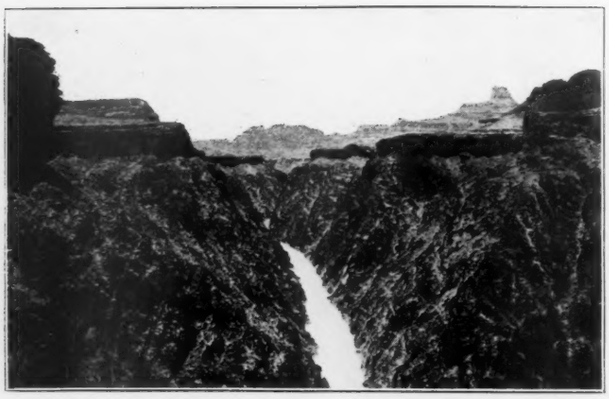
The Platteville Limestone

Overlying the St. Peter sandstone is the Platteville limestone. Its deposition took place in an entirely different sea from that of the St. Peter sandstone, for the geological evidence is clear that an interval of land conditions prevailed for a long time between the two epochs. Each sea invasion seems to have differed in important respects from every other—in the nature of the topography of the land and its drainage, the combination of climatic factors, the vegetal covering, the character of the sediment that found its way to the sea, the forms of life in the sea, and the physical, chemical and biochemical conditions of deposition in the sea. Consequently each formation or a certain portion of a formation has certain potential economic possibilities of a special kind and should therefore receive the closest scrutiny by the use of various, physical, chemical, microscopic, and X-ray methods of examination. And the viewpoint of the investigator must be that new uses are likely to come from such a study, or that substitutes for materials imported may be found. Discoveries in the fields of pure and applied science are constantly being made and new needs for special materials make continuous detailed investigations of our raw resources imperative.



Limestone quarry in LaSalle, Ill., area.

The Platteville limestone is in need of such a study, as are many



The Grand Canyon of the Colorado.

of the other formations. Even now it is of real economic importance. It is high in calcium carbonate and, at Dixon, a part of the formation is being used with other materials for the manufacture of Portland cement. It seems to have distinct possibilities for flux and it might prove to have the necessary properties for the manufacture of rockwool and other materials, but so far no studies have been undertaken. It is important to remember that where the plane of erosion has beveled its associated formations, an eye should be kept open for isolated remnants close to lines of transportation.

The Galena Dolomite

After another land interval the Galena sea invaded the Mid-west and in it was deposited chemical and biochemical sediment of a dolomite variety, surprisingly low in argillaceous or aluminous materials. This formation outcrops over a large area in northwestern Illinois, and contains the lead and zinc ores of northwestern Illinois, southwestern Wisconsin, and northeastern Iowa. Although zinc mining has since waned in Illinois, it must not be assumed that there is no more commercial ore there. Some of the new geophysical methods of prospecting are very worthy of being employed in further search.

The Galena dolomite is still a real commercial asset in quarrying at Rockford and Belvidere.

In southern Illinois a limestone formation known as the Kimmswick and closely related to the Galena but apparently belonging to another sea, is the source of the oil in the newly discovered Dupo pool, south of East St. Louis and in the Martinsville pool of Clark County. It is quarried at Valmeyer for flux in refining aluminum and for agricultural and aggregate purposes.

Maquoketa-Richmond Submergence

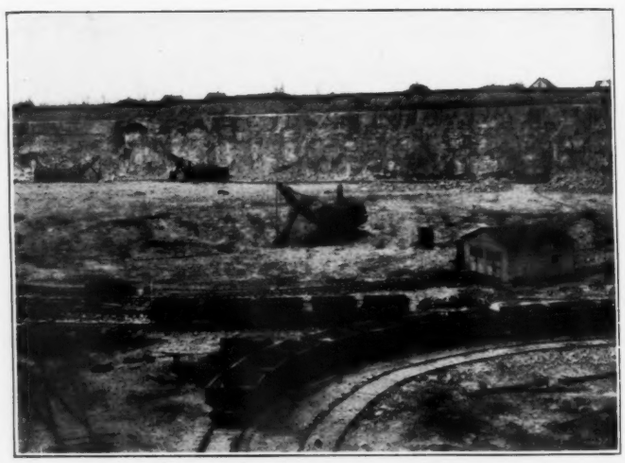
After the Galena-Kimmswick sea had been withdrawn by relative uplift of the continent and the Mid-west had experienced land conditions for a long time, another relative lowering of the continent permitted the Maquoketa-Richmond sea to transgress Illinois and adjacent states, in which a thick formation of mud and some beds of calcium carbonate were deposited. The mud and lime carbonate layers have since become shale and limestone. Mingled among the constituents of shale and limestone were some particles of lead and zinc compounds which later were carried down and concentrated in cavities and crevices in the Galena dolomite by downward percolating waters, after the shale cover had been incised by valleys.

In the Dupo area, and elsewhere, the shale also served as a tight cover for the accumulation of oil in the underlying Kimmswick formation.

Some of the thick limestones of the Maquoketa formation have colors and textures which make them worthy of further investigation as an interior decorative stone.

The Silurian Seas

The Mississippi River bluffs north of Savanna, with their picturesque turreted formations, are made up of Silurian limestones and dolomites, all of marine origin. The Alexandrian strata in the lower part and the Niagaran dolomite in the upper part represent several advances and retreats of the sea. These formations in northwestern Illinois were at one time co-extensive with the Alexandrian and Niagaran formations of northeastern Illinois which are being extensively quarried in the Joliet and Chicago regions. The large quarrying operations in the Chicago-Kankakee-Joliet district, and at Port Byron in northwestern Illinois, furnish enormous quantities of crushed limestone valued at millions of dollars for road material, concrete aggregate, railroad ballast, flux, agricultural limestone, rip-rap, also dolomitic lime, and other uses. The crushed-



A large limestone quarry in Illinois.

limestone industry is Illinois' most important quarrying industry. In the Chicago district there are approximately twenty operating quarries, and Cook, DuPage, Kankakee and Will counties furnish 83 per cent by quantity and 78 per cent by value of the state's output. The crushed-stone resources of the state are tremendous. In the Chicago district most of the existing plants have large reserves of unquarried stone obtainable either by extending or deepening their present quarries, and additional good quarry sites can readily be developed when economic conditions warrant. Some of these sites are adjacent to both rail and water transportation. The same may be said of sites for producing dolomitic lime.

The Devonian Sea Invasions

Thicknesses of strata exceeding 1,000 feet were deposited in the various seas of the Devonian Period in southern Illinois, consisting of limestones, cherts, shales and sandstones. Lesser thicknesses were laid down in northern Illinois, which have since been largely eroded or buried by younger sediments. At Rock Island the Devonian limestone furnishes concrete aggregate, agricultural limestone and road material. It is also used for flux, and for making lime for sugar refining and carbide manufacture. In southern Illinois the Clear Creek chert provides immense quantities of novaculite for road surfacing and silica for abrasive, paint, buffing and ceramic purposes. There is a high calcium limestone in the Devonian System which promises to become the source of a cement industry.

The Mountain Glen sea of late Devonian times laid down the Mountain Glen shale, a bituminous potash shale which further investigations may show will produce potash on a commercial scale.

Mississippian Sea Invasions

The Kinderhook sediments that accumulated in the early Mississippian seas furnish one of the sources of oil in the southeastern fields. The Warsaw limestone furnishes flux in St. Clair county, and the Burlington limestone is a notable producer of lime, whiting and crushed rock in western Illinois.

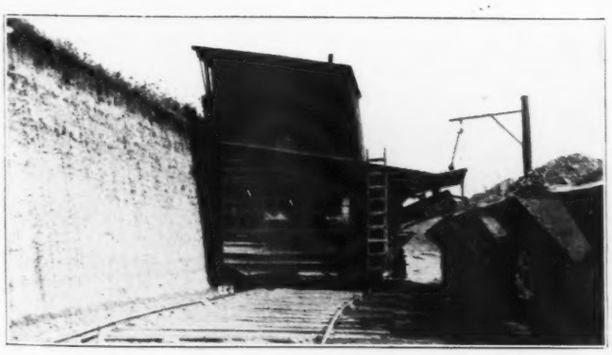
The Salem limestone of southern Illinois is the same age as the Bedford limestone of Indiana, and preliminary examination indicates that it has building stone qualities equal to the Bedford. Farther north near Columbia the Salem furnishes agricultural limestone and road material.

At Falling Springs, St. Clair County, large quarry operations are active in the St. Louis limestone. In Hardin County, the St. Louis limestone is the chief fluorspar bearing formation. In Clark County, it is an oil horizon and is known as the Martinsville.

At Alton, the Ste. Genevieve limestone has made the Alton district a leader in the manufacture of lime and whiting for many years. Illinois' production of lime in 1927 had a value of over one million dollars, surpassing 37 other states.

In Lawrence County, the Ste. Genevieve is one of the reservoirs of petroleum, the porous horizon being known among oil producers as the McClosky sand.

The Chester sandstones of upper Mississippian age are, however, the chief sources of petroleum in the southeastern fields and are therefore to be credited with the larger part of the state's $10,000,000 production in 1929. Some of the Chester shales and limestones in southern Illinois have recently been found to have distinct ceramic properties on a commercial scale.



Commercial operations in moraine Pennsylvania shale near Ottawa, Ill.

Pennsylvanian Sea Invasions

The Pennsylvanian Period is commonly known as the Coal Measures Period. The formations consist of shale, sandstone, limestone and coal. The shale, sandstone and limestone are in part marine, in part fresh-water. At least sixteen different marine invasions occurred, alternating with erosion, fresh water deposition and vegetal accumulation in fresh-water swamps. Some of the marine shales are used to make such products as face brick, building block, common brick and tile and light weight aggregate at Danville, Ottawa, Streator, Peoria, Galesburg, Monmouth, Decatur, Springfield, Carlinville, Albion, and elsewhere, and the fire-clays under No. 2 coal in Grundy, La Salle, McDonough, Scott, Greene and Madison counties produce stoneware, fire brick, flue lining and tile, sewer pipe, face brick, electrical porcelain, whiteware and other products. Both together, the shales and the fire clays are largely responsible for making the clay and clay products industry of Illinois the states' second most important industry and, on the basis of the value of its output which was 35 million dollars in 1928, Illinois outranked 45 other states.

Ripple-marked sandstone.

The La Salle limestone of marine origin and a maker of natural falls in the La Salle area, became the chief basis of the state's Portland cement industry in 1894, by virtue of its high calcium, carbonate content, its aluminous character, and its low content

of magnesia and silica. From a production of $540 worth of cement the first year, Illinois produced in 1928, $11,000,000 worth. There are other places within 150 miles of Chicago where suitable raw materials are probably available, and still more places occur in the western and southern parts of the state.

Illinois during the Coal Measures Period was close to sea-level for several millions of years. At times it stood a few scores of feet above sea-level, and during these stages broad shallow valleys were cut. Then slow subsidence caused these valleys to become filled with fresh-water sediment and wide, flat, featureless alluvial plains to be developed. Continued subsidence of these plains brought on bog conditions over thousands of square miles, affecting large parts of the United States, from Texas, Oklahoma, Kansas and Nebraska on the west to Pennsylvania on the east. The present coal fields appear in the main to be isolated erosion remnants. These bogs were fresh-water and in them grew the quaint, archaic vegetation of that day, the tree-ferns and gymnosperms — the modern group of trees and flowering plants known as the angiosperms had not yet appeared on the Earth.

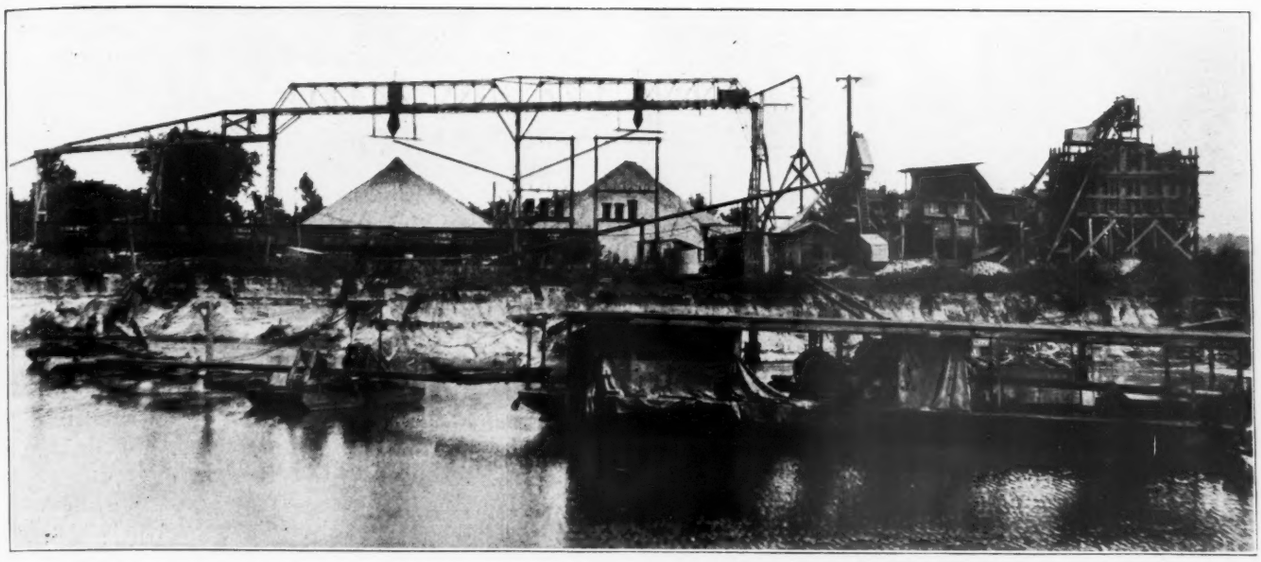
To these swamps and to the successive invading seas, which put the earthen seal upon their products, we owe the preservation and the chemical manufacture of over 200 billion tons of power-giving, health-giving and comfort-giving coal. Each year, for the past six years, 1923 to 1928, for which we have statistics, this treasure-resource has produced on an average 145 million dollars' worth of product and has given employment to an army of men. Likewise but to a lesser degree some of the other Mid-west states have profited. Not only once did Nature bestow this gift upon Illinois but five times, in those commercial beds known geologically as coals No. 1 (Rock Island), No. 2 (La Salle, Colchester, and Murphysboro), No. 5 (Springfield and Harrisburg), No. 6 (Herrin, Brereton and Belleville), and No. 7 (Danville and Streator). These together cover about two-thirds of the state.

Most of this coal is believed to have grown in place. Although old stumps are rarely observed the underclay of the coal beds show numerous root-markings, and in some cases the trunks of trees have been found extending in a somewhat reclining position into the roof of the coal.

Reconstruction of Pennsylvania flora.

These coals range in thickness from an average of 3½ feet in the northern part of the coal field to 8 feet in southern Illinois. In Franklin County as much as 14 feet of coal is known. Although nearly 4 billion tons of coal have been removed or left in the ground in such a condition as will be difficult to recover, this amounts to less than 2 per cent of the estimated original resources.

In closing it seems important to say that, from the standpoint of future supplies of fuel for heat and power, of materials for construction purposes, of flux for blast furnaces, and molding sands for foundries, and of mineral substances for abrasives, glazes, glass-manufacture, and chemical products, it is important to note that the state's available resources are known to be profoundly large. In the case of oil and gas, the supplies are not definitely known. As regards mineral resources, the state's industrial foundation, therefore, seems secure. Any inflow of materials into the state which can be supplied by the state's own industries is a challenge to research to change the economic conditions.



The dredging plant in foreground. In background, left to right: classifying, washing, screening and crushing buildings.

This Iowa Producer Keeps Performance Records of All Machinery

Ottumwa Sand Co. Installs Many Modern Improvements at Sand-and-Gravel Plant

By M. F. BEISBIER

PROGRESSIVENESS is the guiding spirit of the Ottumwa Sand Co. The outstanding success of the company in past years has proved that continuous investigation and application of suitable new equipment to improve the quality of its products and reduce its costs are profitable.

In the Aug. 29, 1928, issue of PIT AND QUARRY, this plant was cited for its economical methods of production. Since then, however, considerable new equipment has been added and numerous changes have been made.

No mention of gravel is made in the company's name—The Ottumwa Sand Co. While the company sells all of the gravel it produces, this item amounts to only a small fraction of the total plant output, since the average of the bed is 85 per cent sand and 15 per cent gravel. C. L. Mikesh, president, states that, inasmuch as the sand is the greatest volume of available material, it is far better, from a business point of view, to be in the sand business, to sell sand, and to base all plant costs and efficiencies on the production of sand. The gravel output, always finding a ready market, is the cream of the business but is not the most important product.

The plant operates successfully on this basis and it is noticeable that no extensive unusable stockpiles of sand are to be found here. The Ottumwa

The barge, with pontoons that support the nozzle line.

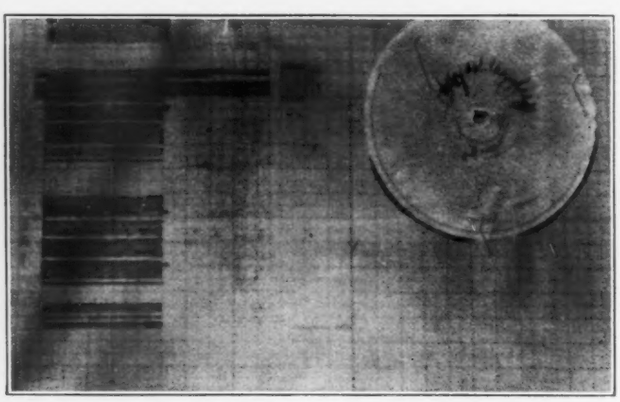
Screening structure. Pipe line from dredge at right.

This tail pulley prevents gravel from injuring belt.

Sand Co. is, primarily, in the sand business—and sells sand!

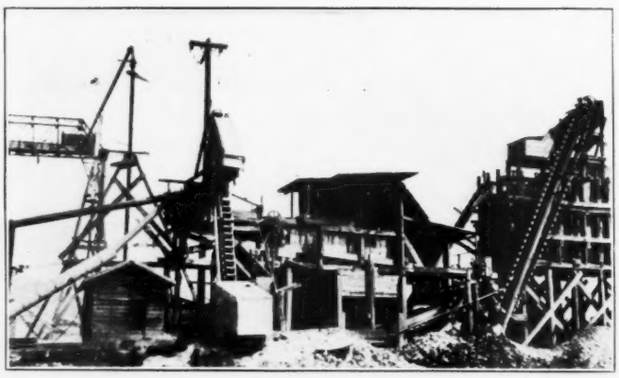
An exceptionally good accounting system of machinery inventory is used to a great advantage at this plant. Mr. Mikesh has devised a system of inventory files which, in combination with a plant-performance sheet, enables him to tell at a glance the exact number of productive hours in any given month and the number and time of shut-downs with their causes. Repeat orders for machinery and supplies are based entirely on the performance records in the office inventory files. Claims of superiority, long life, and outstanding performance are easily accepted or disputed with adequate records such as these.

Every machinery item in use is carded with the date of installation, cost, and time of installation. As new equipment is purchased, a card is made out accordingly. When repairs, adjustments or replacements of broken or worn parts are made the foreman of the plant turns in a note to the bookkeeper, stating the cause, the time lost, and the repair costs. The bookkeeper, in turn, makes the entry on the inventory card.



Production chart and recording dial.

In addition to the inventory file a plant-performance chart is maintained. On the pump-discharge line a Bristol gauge records a 24-hr. pressure-curve on a paper dial. Any fluctuation of the curve due to a blocked pipe-line or a shut-down for repairs is indicated on this curve. This, with a report turned in each night by the dredge operator, indicating the cause of the shut-downs, presents enough data to plot a performance record on graph paper. On the vertical line or ordinate, the dates of the month are lettered, beginning with the 1st and continuing down to the 31st. On the horizonal line or abscissa, the hours of the day are lettered, beginning at 7 a. m. and ending at 7 a. m. If, for example, a record of a 10-hr. day, without shut-downs, would be turned in, the entire line for that particular day, from 7 a. m. to 5 p. m., would be marked in green, excepting the time out for the lunch period. If a shut-down occurred, the time lost would be marked in red. After the month's record is closed, an analysis which presents an excellent plant performance record is made. An excess of red squares indicates the necessity of replacing or overhauling the trouble-causing unit.



Discharge box, screens, washer, crusher, and main elevator.

Some of the new equipment changes include the installation of Link-Belt Shaw classifiers. Considerable difficulties had been experienced in handling the fines of the river sand. Occasional rejections caused considerable delay and inconvenience, not to speak of financial loss. In 1929 two Shaw classifiers were installed, and since then no car rejections have occurred. The classifiers are mounted on a double-span steel gantry, which is 55 ft. high at the higher end, each span being 63 ft. long.

The exceptional height and length of span are required to permit large stockpiles to accumulate so as to supply sufficient material for shipments during periods of shut-downs. This also assures continuous production in the event of car shortages or transfers. A wooden flume carries away the rejected sand and water.

Another interesting improvement is the method of spotting cars. An American 2-drum winch,

driven by a Western Electric 20-hp. motor is the power unit. The ¾-in. wire rope, drawn by the large drum, is looped through a pulley-block, located at the far end of the plant, and back to the car hook. A ½-in. wire rope, drawn from the second drum, is attached to a snatch block fastened on the ¾-in. rope near the hook. After cars are drawn down the track by the ¾-in. rope, the hook is returned to the plant by winding in the ½-in. rope. Broderick & Bascom wire rope is used.

Small pebbles would frequently lodge between the belt and the tail pulley of one of the bucket elevators, causing damage to the belt. A Sprout-Waldron, Monarch brand, cone-shaped pulley was installed and the trouble was remedied, greatly increasing the life of the belt.

Sand classifiers.

Enough oversize gravel, chiefly flat pieces, unable to pass a 2-in.-mesh conical screen, makes crushing profitable. A Universal No. 2 crusher, powered by a General Electric 15-hp. motor, crushes all oversize material.

The dredging is done with an Amsco 8-in. pump, belt-driven by a General Electric 150-hp. motor mounted on a wooden barge. The suction pipe and cutting chain are suspended from a steel derrick mounted on steel pontoons hinged to the barge. The cutting chain is manufactured by the Acme Screen Nozzle Co., of Des Moines, Ia. It is unusual in design, consisting of solid-steel sections joined by pins. It is said to have an exceptionally long life and is free from annoying pin breakage. A Conrath-Leveke vacuum pump is used for priming the Amsco pump.

The dredged material is pumped directly into a wooden discharge-box, to reduce the velocity of the stream, and it then flows into a Gilbert 54-in. screen manufactured by the Stephens-Adamson Co. The 2-in.-mesh material separates all oversize pebbles, allowing them to pass directly to the Universal crusher. A bucket elevator returns the crushed gravel to the Gilbert screen for rescreening.

All material passing through this screen is discharged into a 40-in. by 40-ft. Austin rotary screen, having 10 ft. of ⅝-in. perforations, 4 ft. of 1-in. perforations, and a ¼-in. sand jacket. The two sizes of gravel from the screen are discharged into separate hoppers, each feeding an Eagle gravel washer. One washer is used for each size of material, experience having shown that greater water pressure removes larger and heavier particles of foreign matter when the gravel is handled in this way. The two hoppers also permit small storage capacity and, in the event of breakdowns on the equipment past the screens, small repairs and adjustments can be made without stopping production. The gravel discharged from the Eagle washers is elevated to a Gilbert 60-in. screen with ¼-in. perforations, receiving a second washing from a large fresh-water stream which removes whatever foreign matter is left. From the screen the gravel is elevated to the loading bins.

Steel-link cutting chain.

Sand Handling

All sand and water discharged from the Austin screen flow to a concrete sump, where they are pumped by a Morris Type M centrifugal pump, driven by a General Electric 75-hp. motor, to the Shaw classifiers already described. Carloading is done by a railroad-type clamshell crane.

Gravel washer designed by C. L. Mikesh.

Rope arrangement on car mover.

The plant water-supply is obtained from the dredge pond by two centrifugal pumps mounted on a pontoon float. Changes in the location of the pond necessitate this arrangement. A Dayton-Dowd 5-in. pump and a Fairbanks-Morse 5-in. pump are used. All spouts and chutes subject to abrasion are protected by Goodyear rubber chute lining. Link-Belt roller-chain drives are used throughout on all counter-shaft drives.

The plant has been operated continuously since 1907 and is one of the oldest plants in the state. C. L. Mikesh is president and C. J. Mikesh is treasurer.

Trucks Cut Costs in Quarries of the General Crushed Stone Co.

Can operators feasibly substitute motor trucks for steam equipment in quarries where a shovel of 3-cu. yd. or 4-cu. yd. capacity is used, and where each truck would be called upon to carry 10 to 12 yards of stone each trip? Prior to 1926, the answer was generally negative, although use of trucks with small shovels was not new. Late developments, however, show a complete reversal of opinion among quarry operators. Among the first to attempt the newer method of operation, and now unhesitant to indorse it when conditions are favorable for its installation, is the General Crushed Stone Co. of Easton, Pa.

The first installation of trucks was made in the company's quarry at Winchester, Mass., where three 20-ton locomotives and 35 or 40 contractor cars with the necessary rail and track equipment were replaced by three 7½-ton Mack trucks equipped with specially designed bodies. Three trucks and three drivers thus replaced equipment which required six men to operate, in addition to a force constantly engaged in shifting and repairing tracks.

The saving in labor alone would justify the substitution, if certain other conditions are favorable, the company declares. Among these requirements are length of haul, grades up which it is necessary to carry the full load, and ability to take care of the increased production.

The General Crushed Stone Co. was so pleased with its initial venture that three similar Macks were purchased when the capacity of the White Haven, Pa., plant was increased by changing from a hand- to a shovel-loading operation.

Opinion of the company as to the use of trucks speaks for itself in that it was decided, the following year, to replace steam locomotives and accompanying equipment at the Glen Mills, Pa., plant with four Macks similar to those previously bought.

The eleven large trucks with special bodies now operated by the company at three of its thirteen plants carry more than 800,000 tons of stone annually.

Provided general conditions are such as to warrant investment in trucks, there are seven advantages over rail equipment in the company's opinion. First, greater mobility; second, simplification of management as a result of less equipment; third, steadier flow of stone to the crusher resulting from fewer delays in blasting; fourth, possible elimination of mud capping, which lowers blasting costs and avoids complaints regarding blasting; fifth, elimination of track shifting, maintenance and costly derailments; sixth, safety in avoiding necessity to operate close to a dangerous bank; seventh, usefulness for other purposes when not engaged in the quarry.

Truck operated by General Crushed Stone Co.

The General Crushed Stone Co., existent since 1899, operates thirteen quarries and two sand-and-gravel plants in New York, Pennsylvania, Massachusetts and Maryland. Annual production of crushed stone is 3,200,000 tons and of sand and gravel 200,000 tons.

Engineers and Equipment Manufacturers Discuss Road-Building Problems

A NEW program, planned to widen the scope and increase the usefulness of the American Road Builders' Assn., was instituted in a series of meetings held Sept. 9, 10 and 11, in the new offices of the association in Washington, D. C. The association plans to bring about, for the first time, a closer coöperation between manufacturers of equipment and highway engineers.

Meetings were called by Charles H. Upham, engineer-director of the association and invitations were issued to all members of the Manufacturers' Division. Representatives of two state highway departments were present to give their views, to assist the manufacturers in determining the course of the meetings, and to suggest plans for the work of the committees.

Committees were organized to investigate and make recommendations on the following subjects: snow removal, needs for and availability of maintenance equipment, traffic-control signals, central- and transit-mixed concrete, and guard rail. Individual sessions were held on each subject. Committees were suggested and, in each case, definite plans were made for the course of the committee's action and investigation. In every instance, it was determined to follow as closely as possible the action of the committee on Standardization of Weighing Devices for Concrete Aggregate whose report appears in the recent Annual Report of the American Road Builders' Assn.

The present meetings were held to carry out a plan suggested by The American Association of State Highway Officials.

Snow Removal

The first meeting of the series was held Sept. 9, to discuss the subject of snow removal. W. F. Rosenwald, maintenance engineer of the Minnesota State Highway Dept., was chairman of the committee but turned the meeting over to Mr. DeGlopper, general chairman of the Equipment Committee which is supervising the work of the sub-committees. Mr. DeGlopper is materials and equipment engineer of the Michigan State Highway Dept. He proposed an outline of the activities and the report of the committee. It was suggested that a complete analysis be made of the methods and equipment for snow removal now being used by the various states and municipalities. An informal discussion followed in which the manufacturers and highway engineers present brought up many specific problems which are encountered in removing snow from highways and city streets.

The report of this committee will present an analysis of the types of equipment available and the advantages and limitations of each. It was agreed that the problems which confront the engineer of the city are widely different from those on the state highways and the report will be divided into two sections to care for both types of these problems.

Particular attention will be paid by the committee to costs of snow removal by each method. A questionnaire will be sent to manufacturers of snow-removal equipment and to highway engineers to gather the necessary data.

A preliminary meeting will be held to draft the committee's report. The latter will be submitted at an open meeting to which all manufacturers will be invited and at which the report will be open to revision. The report will be read at the annual convention of the American Assn. of State Highway Officials in Pittsburgh, Nov. 17-20. Suggestions made here will be incorporated in the final report to be presented at the Annual Road Show in St. Louis next January.

A point was brought up at the meeting involving snow removal from air ports. This subject will be investigated and recommendations included in the report of the committee. Data will be gathered for the study of snowfall, including statistics on the normal fall in various sections of the country. This will be of considerable value to engineers in selecting equipment.

The adaptability of ordinary highway maintenance equipment to snow removal will also be analyzed with a view toward avoiding duplication of equipment in highway departments.

A number of suggestions for membership on the committee were made. Membership will include representatives from the manufacturers of equipment, state highway officials, county highway officials, city streets officials, and the executive staff of the American Road Builders' Assn. The complete membership of the committee will not be announced until the men whose names were suggested have accepted appointment.

Following the meeting, Charles Grubb, engineer executive of the County Highway Officials' Division of the Assn., spoke briefly of the enthusiasm developing among the county officials for the Annual Road Show. He described his recent trip to St. Louis in preparation for the show and the sentiment of officials in various parts of the middle west.

Maintenance Equipment

Second in the series was the meeting for the purpose of organizing a committee to make a survey of the needs for and availability of equipment used in the maintenance of state and county highways. As in the case of the snow-removal committee, this committee was formed at the suggestion of the American Assn. of State Highway Officials to bring into closer contact the manufacturers of equipment and the highway engineers.

According to the plan outlined by Mr. DeGlopper, who presided at this meeting, it is intended to make a survey of the entire maintenance field. Types of equipment now applied to certain maintenance prob-

lems in local sections will be described in the report and made available to county and state engineers in every part of the country. Methods not in general use will be investigated and the report sent to every state and county engineer in the United States.

General informal discussion followed the introduction of the subject by Mr. DeGlopper. A plan was developed to form the outline of the committee's action and its report.

The committee will be composed of representatives of both county and state highway officials and equipment manufacturers. It will send out a questionnaire immediately to manufacturers of equipment and to highway engineers to gather data on maintenance equipment and methods and suggestions for further lines of inquiry.

The discussion developed the necessity of dividing the investigation and subsequent report into several sections. One will investigate and report on equipment for maintaining untreated highway surfaces of earth and gravel. Another will care for macadamized roads, and another for concrete. Problems such as grading, ditching and ditch cleaning will be thoroughly investigated and recommendations for equipment to handle the various types of work will be made.

It is expected that the report of the committee will effect greater economies and efficiency by centralizing information concerning equipment and methods.

A preliminary report will be made from material resulting from a questionnaire sent to all equipment manufacturers and highway departments. This will be read in an open meeting immediately preceding the annual convention of the state highway officials in Pittsburgh, and suggestions for additions and revisions will be heard. Following this meeting a second meeting will be held to draft the final report which will be presented at the Road Show in St. Louis.

Traffic-Signal Controls

The meetings Sept. 10 opened with the subject of Traffic-Control Signals. Charles Upham introduced the subject, explaining the position of the American Road Builders' Assn. in bringing manufacturers and highway engineers together for closer coöperation.

Mr. DeGlopper then took charge of the meeting and called on the manufacturers present for their views regarding the scope of the work of the committee to be organized. General discussion followed, bringing out the need for standardized signal equipment for the control of traffic.

Among the problems encountered was the fact that more than two hundred thousand variations of metal signs are required to meet the demands of the state, county and municipal street and highway departments. Highway engineers and manufacturers were agreed that, in the interests of economy and also the safety of motorists, greater standardization is vital.

It was suggested that the report be divided into sections separating the metal warning signs from the electric signals.

Names of men suggested for membership on this committee included the following: Miller McClintock, Erskin Bureau of Traffic Research, Harvard University; Burton W. Marsh, traffic engineer, Philadelphia, Pa.; Hawley Simpson, research engineer, American Electric Railway Assn.; Geo. C. Wright, county supt. of highways, Monroe County, New York, and Mr. Baker, Wayne County, Mich. Manufacturers will be represented by the three manufacturers present at the meeting including T. R. Willwerscheid, Western Stamping and Manufacturing Co.; Guy Kelcey, manager traffic engineering division, American Gas Accumulator Co.; Harold Wyman, asst. director of sales, Automatic Signal Corp., and Arthur Straits of Wallace-Tiernan Products, Inc. State officials will be represented by Harry Neal, also chairman of the committee; W. F. Rosenwald and Geo. Hamlin, both of the State Highway Department of Minnesota.

It was agreed to send out a letter immediately from the American Road Builders' Assn. to the leading manufacturers concerned with traffic-control devices, outlining the proposed work of the committee and asking for a letter or report of their experience with the problems confronting the committee and for suggestions for further activities for the committee.

A letter will be sent to all state highway departments requesting their viewpoint toward the work of the committee and their suggestions.

A meeting of the committee will be held at the time of the State Highway Officials' convention in Pittsburgh, where the collected data will be analyzed and the report drafted. The final report will be presented at the Road Show in St. Louis next January.

Pre-Mixed Concrete

Of greatest interest to readers of PIT AND QUARRY was the preliminary meeting of the committee on Central- and Transit-Mixed Concrete. In anticipation of this meeting, P. F. Seward, assistant engineer of the American Road Builders' Assn., had made a brief investigation of the attitude of the state and county officials toward central- and transit-mixed concrete for highways.

In a brief talk he outlined the findings of the investigation. He emphasized the fact that, through the central and western states, central- and transit-mixed concrete is not permitted for highway construction because the officials have no definite information on the subject and are unwilling to have it tried. Others are opposed to its use because their tests made several years ago, before the equipment for producing and delivering it was perfected, resulted unfavorably. Others object to it on the grounds that the trucks delivering it cut up the subgrade of the highway after it has been prepared for paving.

Following Mr. Seward's report, Mr. DeGlopper, chairman of the meeting called on the equipment manufacturers present for recommendations for the course of the committee's action and outline of the report. A general discussion brought out a number of problems dealing with equipment requirements and the need for a report which will present the case for central- and transit-mixed concrete to the highway departments.

It is planned that the committee will work in close coöperation with the recently formed National Ready-Mixed Concrete Assn., and J. E. Burke, president of that association, will be asked to accept appointment on the committee.

The names of men proposed for membership on the committee includes representatives of manufacturers of central-mixing plants, transit-mixed concrete units, ready-mixed concrete conveyor trucks of all types; producers of ready-mixed concrete; contractors; and city, state and county departments.

A report will be requested from the staff of the American Road Builders' Assn. from data already collected. A meeting of the committee will be held immediately before the State Highway Officials' meeting in Pittsburgh, Nov. 17-20, and a report prepared. This will be submitted to the proper committee of the State Officials' group. The final report will be presented at the annual convention of the American Road Builders' Assn. in St. Louis. Meanwhile a thorough canvass of all of the groups mentioned will be made to gather every bit of available data for the report in the limited time. Special attempts will be made to reach every manufacturer of equipment used in this industry.

Guard Rails

The final meeting on Sept. 11, was opened by Mr. Upham for the purpose of organizing a committee to investigate the subject of Highway Guard Rail. Mr. Upham introduced C. N. Connor, engineer executive of the American Road Builders' Assn., who described the survey which is being made in this field and outlined some of the information which has already been received in reply to a questionnaire sent out to the state highway departments. He also discussed the results of tests made by the Department of Highways of Pennsylvania.

The membership of the committee will be named later. A list of suggestions was prepared, including manufacturers of each type of guard rail, and representatives of each division of the American Road Builders' Assn.

The committee will summarize all data previously collected on this subject and draft a report which will be sent out for criticism and remarks. The report will be rewritten incorporating these suggestions and presented at the Highway Officials' meeting in Pittsburgh. It will then be put into final form and submitted at the American Road Builders' Assn. Convention in St. Louis.

Attending the meetings were the following:

Charles M. Upham, engineer-director, A. R. B. A.
C. N. Connor, engineer-executive, A. R. B. A.
Charles Grubb, engineer-executive, A. R. B. A.
L. A. Brookover, publicity director, A. R. B. A.
William Ogden, manager, Manufacturers' Division, A. R. B. A.
D. R. Lamson, assistant engineer, A. R. B. A.
P. F. Seward, assistant engineer, A. R. B. A.
J. P. Cockey, assistant engineer, A. R. B. A.
M. DeGlopper, materials and equipment engineer, Mich. Dept. of Highways.
A. C. Toner, Washington manager, Portland Cement Assn.
W. F. Rosenwald, maintenance engineer, Minnesota Dept. of Highways.
Herbert N. Bell, Biehl Iron Works.
G. R. Connor, Allis-Chalmers Co.
A. P. Robinson, Ransome Concrete Machinery Co.
C. S. Embrey, Mixer Manufacturers' Bureau.
Robert T. Harris, Blaw-Knox Co.
Guy Kelcey, manager traffic engineering division, American Gas Accumulator Co.
Harold Wyman, asst. director of sales, Automatic Signal Corp.
T. R. Willwerscheid, Western Stamping and Mfg. Co.
C. A. Young, American Wire Fence Co.
H. D. Worthington, American Steel & Wire Co.
R. J. Temple, manager Chain Link Fence Dept., Page Steel & Wire Co.
J. T. Fritz, Horace T. Potts & Co.
J. P. Dennebaum, Standco Highway Guard, Standard Iron Works.

Dewatering of Clays by Electrical Method Subject of Tests

The electrical method for the dewatering of clays is being given a thorough trial at the Northwest Experiment Station of the United States Bureau of Mines, in co-operation with the University of Washington, Seattle, Wash. Of the different methods used for dewatering in the United States, the filter-press method is most popular. The chief disadvantage of the common filter-press is the fact that it is not continuous. The continuous filter-press has not attained wide use because of the difficulty of removing water from the plastic clay bodies without auxiliary drying apparatus. The electrical method, because it can be made continuous, with lower labor costs, and for other reasons enumerated later, may prove both interesting and profitable.

The only plants using the electrical method in the clay industry are located in Germany and Czechoslovakia. Count Schwerin, inventor of the process, was a native of East Prussia. He first became interested in the possibilities of electro-osmosis for dewatering peat and later he applied and patented the idea for the removal of water from clay suspensions.

At a plant at Karlsbad, Czechoslovakia, the fine clay remaining in suspension after purification by washing is fed to six electro-osmosis machines which bring the clay out in a continuous sheet 5 ft. wide and ⅛-in. thick containing an average of 35 per cent water. The depleted suspension is pumped back to the head of the plant. The dewatered clay is pressed into tubes and further dried in tunnel dryers. According to Herr Meyer, Manager of the Karlsbad company, the capacity of the plant is 78 tons of dry "edelkaolin" or electrophorized kaolin per 24 hours. This plant introduces a recognized quality of clay which is used for fine porcelain.

A study of data obtained from this company, together with a review of literature on the subject and results of experiments conducted at the Northwest Experiment Station of the United States Bureau of Mines, suggests the following conclusions:

1. The electrophoresis process removes the clay from the water but does not affect any appreciable purification of the clay. The purification obtained

(Continued on page 62)

Finds Pre-Mixed Concrete Field 'Made to Order' for Gravel Producers

Keefner Concrete Co. Operated as Unit of Material-Producing and Sales Group

THE adaptability of a ready-mixed concrete plant to a sand-and-gravel pit or yard is well demonstrated in Des Moines, Ia., where the Keefner Concrete Co. has recently completed its new plant.

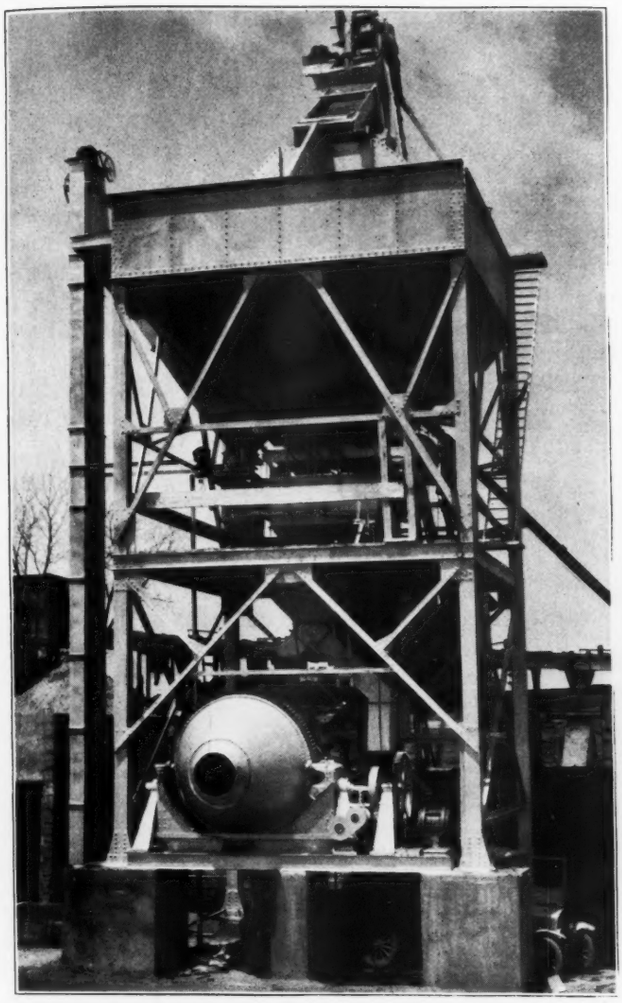
This ready-mixed concrete plant will be operated as a unit of a group of companies of which John Keefner is president, namely, the Des Moines Building Material Co., the Hawkeye Co-Operative Sand & Gravel Assn., and the Keefner Concrete Co. The operation of this group under one head offers an excellent opportunity to serve the Des Moines building-material supply market in an efficient manner, from a selling as well as from the operating point of view. Mr. Keefner's life-long contacts in the Des Moines market places the new corporation in a very favorable position, and advance orders indicate a brisk future business. Mr. Keefner is ably assisted by his son, Joseph Keefner, vice-president, and Albert Peterson, secretary-treasurer.

The new plant is located adjacent to the tipple and stockpiles of the Hawkeye Co-Operative Sand & Gravel Assn. This is a valuable feature and a great convenience, inasmuch as the stockpile of the gravel company becomes the stockpile of the ready-mixed concrete plant. No additional sidetrack is required, while no additional material-handling equipment, such as cranes or gantry cranes, will be needed. Thus the initial investment is reduced to a minimum —the bare cost of the mixer, hopper and batching equipment.

Sand and gravel are pumped from the Des Moines river-bed. An unusual method is employed consisting of a power drag-scraper and a pump located at the river-bank. The scraper drags the material from the river-bed into a sump located at the foot of the pump-house, from which it is lifted to the screen equipment of the tipple. This method is used to overcome the difficulty encountered in the operation of a dredge in the swiftly flowing Des Moines river. For a more complete description of the sand and gravel production method, see PIT AND QUARRY, Aug. 28, 1929, "Sand and Gravel Plant Has Unusual Method of Excavating," by W. E. Trauffer.

As previously mentioned, the stockpiles of sand and gravel will be used for the ready-mixed concrete plant. Beneath the stockpiles is located a conveyor belt which transfers the sand and gravel to the hopper elevator. The Hawkeye company has a number

Stiff-leg track crane and stock storage.

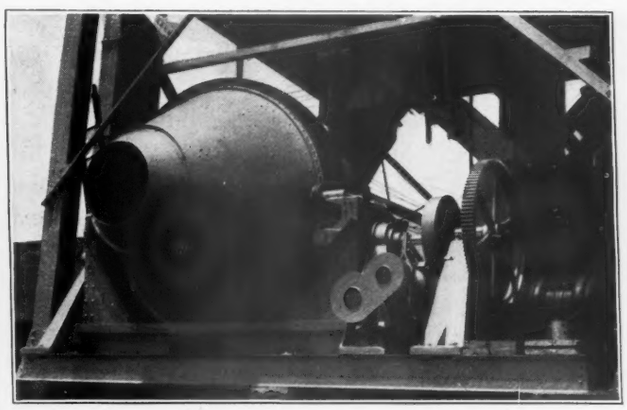


Structure of ready-mix plant. Note pants-leg chute for dry truck loading.

of concrete stalls built under the stockpiles for the purpose of loading trucks. These stalls permit the ready installation of the belt conveyor, with access to dumping gates under each pile. The conveyor consists of a Cincinnati Rubber Co. 18-in. belt, 85 ft. long. It is belt-driven by a General Electric 5-hp. motor. The discharge is made directly into a small concrete sump with a natural flow to the elevator buckets.

The elevator, which handles both sand and gravel, discharges into a special chute which directs the sand to two sections of the main hopper, and the gravel to the other two sections. This chute, of course, is hand-operated. The elevator is made by the Chain Belt Co. and consists of 7-in. by 7-in. by 14-in. buckets mounted on a chain belt. It is 70 ft. high. A General Electric 15-hp. motor is the power unit.

Cement will be purchased from the Hawkeye Cement Co. plant which is located nearby. It will be hauled by trucks and will be dumped at the foot of the cement-hopper elevator. A small concrete sump has been especially designed to accommodate the trucks which will dump, under cover, to the boot of the elevator. This elevator is of Link-Belt manufacture and has 5-in. by 8-in. by 7-in. buckets mounted on a chain. It is 60 ft. high and discharges directly into the cement hopper.

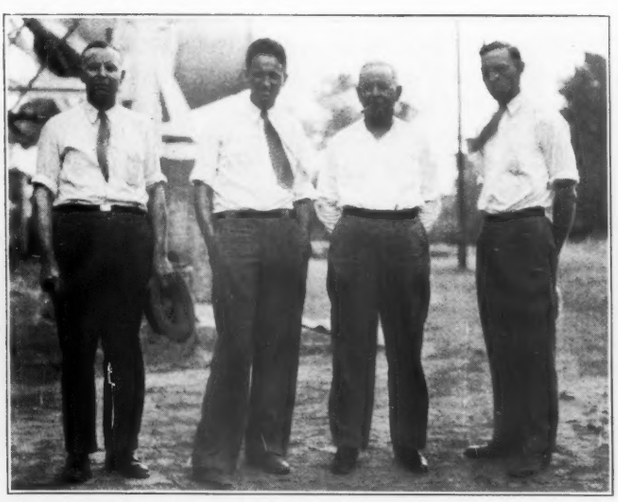


The 2-cu. yd. tilting concrete mixer.

The mixing plant consists of the steel sand-and-gravel hopper, cement hopper, batchers, scales, and the mixer. This entire equipment was purchased outright and erected by the Keefner men.

The steel sand-and-gravel hopper consists of a 4-partition hopper mounted on steel I-beam columns adequately braced by angle-iron sections. Each par-

The ready-mix crew.



Left to right: Roy Pates, shipping clerk; Joe Keefner, vice-pres.; John Keefner, pres.; Albert Petersen, secy.-treas.

Gravel batcher and scale.

tition has its own dumping-gate lever operated from the batching floor. The estimated capacity of the hopper is 75 cu. yd. It was built by the Butler Bin Co.

The batching equipment is also of Butler make, designed for a 2-cu. yd. mixer. The gravel batcher is fitted with an American Kron scale, with an exceptionally large, readable dial having an oil dashpot feature which prevents excessive sway of the pointer. The two dumping gates of the batcher discharge into the mixer chute directly below. The cement batcher is mounted adjacent to the gravel batcher and discharges into the mixer chute directly below. Above the cement batcher, and suspended from the gravel hopper, is the cement-storage hopper with a capacity of about 220 cu. ft. A Winslow beam-scale is used to weigh the cement batches.

The water-control equipment consists of a steel tank, also located on the batching platform. It will be calibrated and controlled by a hand-operated valve. Its rating will be in gallons.

A T. L. Smith 2-cu. yd. tilting-type mixer has been installed on a special channel-iron platform built at a convenient height for truck loading. The mixer is driven by a General Electric 40-hp. motor with pinion-and-gear drive. The material chute to the mixer has a Y-elbow, one branch leading to the mixer, the other branch unconnected. The latter has been installed for the future addition of a 1-cu. yd. mixer to be used for small orders and reserve capacity.

Delivery of the mixed concrete is made in bathtub-type bodies mounted on International trucks. Each truck is fitted with a hydraulic hoist. Several 1½-ton Ford trucks will also be used.

Prof. W. M. Dunagan of the Materials Laboratory of Iowa State College, Ames, Ia., will act as consulting engineer of the plant; and the Patzig laboratory of Des Moines will have charge of inspection. The plant has been in operation since Aug. 1, 1930.

Quarry Blast in Chicago Suburb

(*Continued from page 40*)

quarry blasting and is considered one of the best in this line. Du Pont was well represented by E. T. Lednum, manager, C. J. O'Neill, assistant manager, and A. J. Shoemaker, all of the Chicago office, and Sam Russell, explosives expert.

The Brownell Improvement Co. has, in the past, made many larger shots but these were on the first level where the face varies between 75 and 85 ft. in height. With the 25-ft. face on this level it was not considered economical to attempt a shot of any greater depth. An article describing a larger blast at this quarry was published in the Sept. 26, 1928, issue of PIT AND QUARRY on page 54.

Mineral Production in 1929 Exceeds Total of Previous Year

The value of the mineral products of the United States in 1929 was $5,830,000,000, or 8 per cent greater than the value of the 1928 mineral output, says the United States Bureau of Mines, Department of Commerce, in a statistical review. The upward trend was, however, neither general nor uniform and did not bring the total to preceding high levels of the last decade—$6,213,600,000 in 1926, a year of marked prosperity, and $5,986,500,000 in 1923 and $6,981,340,000 in 1920, two years of high price levels. Comparisons for the major groups of mineral industries show that the total value of metals produced in 1929 has been exceeded only twice—in 1923 and 1920—in the past decade; that the total value of all nonmetallic products, except fuels, was less in 1929 than in any year of the decade except the first three; and that the value of all mineral fuels in 1929 surpassed that for each year of the decade except 1926, 1923, and 1920.

The total value of nonmetallic products (not including fuels) decreased about 5 per cent in 1929 as the result not only of decline in quantity of production of a number of important items but also by reason of generally lower price levels for nonmetallic products. The decline in the total is due to the preponderance of the structural materials, in the use of which there was recession in 1929, whereas most of the chemical, metallurgical, and other industrial mineral materials show increases. Among the structural materials stone increased slightly in quantity but less in total value. Production of lime, cement, gypsum, and structural clay products all decreased between 2 and 5 per cent in quantity and 2 and 9 per cent in value. Sales of raw clay, largely by reason of demand from metallurgical industries, showed an increase of 8 per cent in volume but of only 5 per cent in value. Production of other ceramic materials—feldspar and silica—decreased. Shipments of phosphate rock for export in 1929 were the largest in 25 years; the total shipments increased 7 per cent in quantity but only 6 per cent in value compared with 1928.

Northwest Regional Cement Safety Meet Held at Seattle, Wash.

By W. A. SCOTT

THE Northwest Regional Safety Meeting, at Seattle, Sept. 9, 1930, was held under the auspices of Portland Cement Association members in the Pacific Northwest, comprising the following companies:

Beaver Portland Cement Co., Gold Hill, Ore.,
British Columbia Cement Co., Ltd., Victoria, B. C.,
International Portland Cement Co., Irvin, Wash.,
Lehigh Portland Cement Co., Metaline Falls, Wash.,
Northwestern Portland Cement Co., Grotto, Wash.,
Olympic Portland Cement Co., Bellingham, Wash.,
Oregon Portland Cement Co., Oswego and Lime, Ore.,
Pacific Coast Cement Co., Seattle, Wash., and
Superior Portland Cement Co., Concrete, Wash.

This meeting was sponsored by the Portland Cement Assn., as are other similar regional meetings held periodically in many parts of the country. One of the first addresses at the Seattle gathering was delivered by A. J. R. Curtis, assistant to the general manager of that association, Chicago, Ill., who reviewed the Progress of Safety Work for 1929, as applied to the cement industry.

The attendance numbered about 120 persons, all of whom were interested in some branch of the cement industry. The majority was made up of men on the operating staffs of the cement plants represented, consisting of superintendents, engineers, chemists, department foremen and crew members. The papers, addresses and first-aid demonstrations were of special concern to mill and quarry foremen and their forces of men who are most exposed to the various hazards of mill and quarry work.

The Safety-First movement, as developed and sustained by the executives and managers in this industry, exemplifies a system of training that makes the employee more alert and guarded in protecting himself and his fellows from accidents that may result in personal injury. A coördinate part of the system consists of training a number of men in each department in first-aid performances. The leading thought in most that was said at the meeting was that safety in operating depends upon training and coöperation on the part of the workers under the directions of superintendents and foremen, and that safety is one of the measures of efficiency. Inasmuch as there are always a few men dropping out whose places are filled by new men, the system of training in safety operation becomes a constant necessity. The papers, addresses and discussion, in the most part, revolved around the mill foremen and their success in maintaining a high standard of safety practice and efficiency. As regards safety appliances for cement mills, it is believed that equipment manufacturers are keeping pace with the safety-first movement in providing those things most in demand for the protection of employees.

An interesting program for the meeting had been prepared, and the forenoon and afternoon sessions were presided over by C. N. Reitze, general manager of the Superior Portland Cement Co., who, in opening the meeting, spoke briefly of the purposes and scope of the safety training as developed in the cement industry. He then presented Mayor Frank Edwards, of Seattle, who gave a welcoming address.

A. J. R. Curtis, assistant general manager, Portland Cement Association, in noting the Progress of Safety Work in 1929, gave some facts as to the percentage of cement-mill accidents in different regional districts, showing substantial decreases in most cases. According to his views and observations, the safety movement in industry is what athletics are to a college; accidents are intolerable because they are preventable; the success of safety training depends upon the spirit put into it; the men hired should either be trained men or those who can be trained readily; safety equipment should be installed, and adequate illumination should be provided. Mr. Curtis referred to the record of 27 cement mills that operated without accident during 1929.

H. T. Brewer, mill superintendent, International Portland Cement Co., Irvin, Wash., read a paper on the Prevention of Electrical Accidents. In concise language he mentioned some of the electrical hazards in operating cement mills and recommended such improvements as will tend to reduce those hazards. He referred specially to conditions in some of the older plants in which the original installations had exposed wiring and ungrounded or poorly grounded equipment. Such plants are generally being brought up to proper safety standards by alterations and, in some cases, by entirely new installations. In the case of unsafe equipment, he suggested placing a proper guard around it to protect the inexperienced man. Mr. Brewer attributed many accidents to faulty and insufficient lighting. All lights, he stated, should be so placed as to afford adequate illumination where it is most needed and to prevent blinding glares.

Common Sense Safety was the subject of a convincing paper by Ben Hammond, safety engineer for the Olympic Portland Cement Co., Bellingham, Wash. As might be assumed, on reading the above title, Mr. Hammond pursues the course that is practical and readily understandable. He has instituted regular safety meetings of the men at this plant and commends such meetings to other concerns. His methods are to develop individual responsibility among the employees, that they may acquire a training based upon good judgment and common sense. He would teach men to adapt themselves to a system of coöperation, directed by those in charge. Mr. Hammond thinks the frequency of industrial accidents in a plant is evidence that there is something wrong.

David H. Leche, general plant superintendent for the Oregon Portland Cement Co., operating mills at Oswego and Lime, Ore., presented a paper devoted to Injuries Involving Strains, Falls and Bruises, and the Resulting Cost of Time. He first considered the subject of strains, and defined this kind of injury as that produced by the over-stretching of muscles. Sprains, a different type of injury, occur only at joints, and result from stretching, twisting and the partial breaking of the ligaments. Strains, he stated, may be caused by heavy lifting or a sudden twisting of the body. Such injuries may be guarded against by cautioning men against lifting too heavy a load. The fact that, in some cases of strains, there may appear no outward evidence of injury gives rise to questions, sometimes, as to whether they are real or feigned. It is asserted that the Oregon State Accident Commission finds claims for strains very hard to handle, due to their uncertainty. Mr. Leche concluded by saying that falls and bruises have been the cause of considerable loss of time, but that injuries due to such accidents are simpler, with no elements of uncertainty about them.

George C. Hewitt, industrial engineer for the Pacific Coast Cement Co., Seattle, Wash., was then introduced. His comprehensive paper on The Foreman's Responsibility in Safety elicited close attention. The speaker said the character of the position makes the foreman the most important figure in the work of accident prevention. He is the person upon whom the executive officers depend for carrying out their safety plans. The foreman's qualifications to maintain safety practice in the mill operations will naturally bring about high efficiency. No plant operation can be considered efficient unless its accident rate is low.

The fact that the foreman, in some cases, puts safety practice in a secondary place is often because he is being held responsible for speed in production and the maintenance of a certain standard of product. Mr. Hewitt devoted some attention to the selection of men for cement-mill work with the view to securing those who may be readily trained in efficiency and safety.

C. E. Hutchinson, foreman of the packing department in the plant of Superior Portland Cement Co., Concrete, Wash., read an excellent paper on Safety in Storing, Packing and Shipping. In this he spoke from actual experience, going into some detail concerning the hazards of that department and outlining the training and care necessary as a means of avoiding accidents. He gave consideration to protection from dust, referring to the Howard dust shield as a device of merit. Mr. Hutchinson said, in conclusion, that the foreman should be a safety engineer.

A. F. Krabbe, general superintendent for the Olympic Portland Cement Co., Bellingham, Wash., referred to the low accident records of the Olympic plant and the methods of avoiding and preventing accidents. Other speakers were W. H. Green, plant superintendent for Pacific Coast Cement Co., Seattle, and Victor Zellinsky, of the British Columbia Portland Cement Co., Victoria, B. C.

The first feature of the afternoon session was an address by Claire Bowman, director of the Washington State Department of Labor and Industries.

A First-Aid contest followed, conducted, under the rules of the U. S. Bureau of Mines, by John G. Schoning, of the Bureau's Northwest Experiment Station, Seattle. The judges comprised members of the Seattle Fire Department, under direction of Battalion Chief John McCloud. At the conclusion of the contest a trophy was presented to the winning team by H. H. Sanderson, of the Sanderson Safety Supply Co., Seattle.

The competing teams were those of the following cement companies: Olympic Portland Cement Co., Oregon Portland Cement Co., Superior Portland Cement Co., and the Pacific Coast Cement Co. The judges awarded first place to the team of the Superior Portland Cement Co.

The meeting closed with a dinner in the evening, attended by about 150 persons, and accompanied by features of entertainment. W. P. Cameron, of Olympic Portland Cement Co., presided at the noon-day luncheon, and N. D. Moore, of the Pacific Coast Cement Co., acted as chairman in the evening.

Among those present at the meeting were: Wylie Hemphill, president of the Seattle Chamber of Commerce; L. C. Newlands, president of the Portland Chamber of Commerce, and vice-president of the Oregon Portland Cement Co., Portland; Frank J. Barrett, district manager, Portland Cement Assn., Seattle; S. H. Ash, mining engineer, with U. S. Bureau of Mines, Berkeley, Cal., and James H. Kane, attorney, Seattle.

Dewatering Clay by Electricity

(*Continued from page 57*)

at Karlsbad, for example, is not obtained in the electrophoresis machines but in the washing and settling apparatus. It is due in part to the dispersion by electrolytes which allow the impurities to settle out.

2. The degree of dryness obtainable with a given clay and the amount of electrolyte and electric current necessary for this, are, to a large extent, individually characteristic of the clay in question. In general, it would appear that fine-grained clays with low content of soluble salts give higher yields of dryer clay per unit of current consumption than coarse-grained clays.

3. If the temperature of the suspension is allowed to rise above a certain maximum, approximately 40 deg. C., the efficiency of the process is decreased, due to the increased conductivity.

4. Whether the electrophoresis process can displace the filter-press for dewatering a given clay suspension depends upon (a) the manner in which the given clay responds to the treatment, (b) on the relatively greater costs of installation and power consumption of the electrical process as against the greater labor costs of the filter-press. Other factors might enter, as, for instance, the possibility of control of the process whereby, instead of complete dewatering, a thick slip could be produced to be used directly for casting of whiteware.

MEN OF THE INDUSTRY

The portrait printed on this page in each number of PIT AND QUARRY is selected without significance as to current events or the position of the individual in the industry.

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W. P. HODGKINS
President
Moulding-Brownell Corp.
Chicago, Ill.

Personal Mention

Edmund Stinnes of Berlin, Germany, well-known as the son of the late Hugo Stinnes, German industrialist and capitalist, will attend the Sixth International Road Congress in Washington, October 6-11, it has been announced. Mr. Stinnes is coming as a representative of the Society for the Promotion of Automobile Highways. **Joseph Brix** of Berlin-Charlottenburg, government consulting engineer, will also represent the Society at the Congress.

Max A. Berns, publicity manager of the Universal Atlas Cement Co., is taking an active part in the management of the Sunday Evening Club in River Forest, a residential suburb of Chicago, Ill.

E. L. Eriksen, professor of structural engineering at Purdue University, has accepted an appointment to the chair of engineering mechanics at the University of Michigan. He will be succeeded at Purdue by **S. C. Hollister,** a graduate of the University of Wisconsin with teaching experience at the University of Illinois, but who has recently been engaged in private practice in structural engineering.

H. A. Lomax is now general manager of the Wheeling Mold & Foundry Division of the Continental Roll & Steel Foundry Co., Wheeling, W. Va.

Charles E. Grubb, formerly county engineer of New Castle County, Del., has joined the staff of the American Road Builders' Association as executive engineer in charge of the organization's County Officials' Division. Mr. Grubb is a past-president of the division which he now manages.

Ward P. Christie, after ten years of service as engineer for the Associated General Contractors of America, with headquarters in Washington, D. C., has resigned to become associated with Ulen Co., international contractors, of Lebanon, Ind. Mr. Christie's new duties will include research and investigation.

F. A. Rumbarger has been appointed representative of the Browning Locomotive Co. in the Pittsburgh territory.

Dr. J. Paul McClintock, professor of geology in Princeton University, Princeton, N. J., lectured Sept. 4 upon "Our Inheritances from the Ice Age" before the Western Society of Engineers, Chicago, Ill. This address was one of a series dealing with the geological-engineering conditions within the midwestern states, particularly within Illinois. Other speakers were **Dr. M. M. Leighton,** chief of the Illinois Geological Survey, who spoke, Sept. 2, upon "What the Paleozoic Submergencies Did for Today's Civilization"; **Dr. Cary Croneis,** assistant professor of paleontologic geology, University of Chicago, whose subject, Sept. 7, was "Earth Movements and the Accumulation of Oil and Gas"; and **J. R. Van Pelt, Jr.,** curator, division of geology and mineral industries, Museum of Science and Industry, Chicago, Sept. 11, upon the subject, "Minerals and Man."

C. T. Connelly, formerly of the Detroit office of the Independent Pneumatic Tool Co., Chicago, manufacturer of pneumatic and electric tools, has been appointed manager of the company's Buffalo office.

Alex Benecke, the American representative of the Deutsche Edelstahlwerke, A.-G., has returned to his New York office, 347 Madison avenue, after a visit to the steel mills of the company in Germany.

F. J. Selinger was recently appointed sales manager of the Pennsylvania-Dixie Cement Corp. His headquarters will be at 521 Fifth Ave., New York, N. Y. Mr. Sellinger became associated with the Penn-Dixie organization some months since and during the past 23 years he was connected with the Atlas Portland Cement Co.

L. C. Conradi is metallurgist, Lycoming Manufacturing Co., South Williamsport, Pa.

L. I. Shaw succeeds G. S. Rutherford as chairman of the standing committee on Relations with the American Society for Testing Materials of the Western Electric Co.

Henry Harnischfeger, president of the Harnischfeger Corp., Milwaukee, has returned from a visit of four months in Europe. The principal objective of his tour was to lay the corner stone of a new school in Salmuenster, Hessen-Nassau, Germany, his birthplace, for which he is furnishing the funds.

W. Mathney and **C. Williams,** of Waco, Texas, are building a limestone crushing plant near Waco on a 500-acre site recently purchased.

Wilhelm Richard Boeckl will be one of the delegates to the Sixth International Road Congress in Washington, October 6-11. Mr. Boeckl is a member of the executive committee of the Austrian Association for Highways with headquarters in Vienna. Two other Austrians will be in attendance at the Congress. They are **Wilhelm Markl,** well-known highway engineer, and **Karl Malik,** also an engineer, both of Vienna.

B. H. Mac Neal has been appointed southern district manager of the crane-shovel-dragline division of Link-Belt Co., Chicago. He will have his headquarters at the company's Birmingham office.

He will be in charge of the territory between the Mississippi valley and the east coast, south of and including the states of Tennessee and North Carolina.

R. H. Pratt, formerly manager of the cold-rolled strip and spring department in the New York office of the American Steel & Wire Co., has been made assistant general manager of sales succeeding R. L. Foster, who resigned to become general manager of sales for the Wickwire Spencer Steel Co. Other promotions are **John Graham** to manager of the cold-rolled strip and spring department, New York, and **W. H. Jennings,** assistant general manager of sales at Baltimore.

Ralph A. Sherman, formerly fuel engineer, United States Bureau of Mines, Pittsburgh, has been appointed to the staff of the Battelle Memorial Institute, Columbus, Ohio, to direct research on combustion.

Obituary

Judge Frederick C. Robertson, one of the first to utilize the vast quantities of oyster shells on the Gulf of Mexico in the manufacture of Portland cement, died recently at his home in Aransas Pass, Tex., at the age of 65 years. Judge Robertson was instrumental in the affairs of the Monolith Portland Cement Co. for many years. He was an eminent lawyer and a native of Baton Rouge, La.

Joseph C. Wickersham, for several years identified with the Koppers Construction Co., Pittsburgh, as an inspector of various types of steel construction, died at his home in that city recently at the age of 60 years. He was born in York County, Pa., and began his business career in the steel industry at Harrisburg, Pa. In 1916 he became chief metallurgist for the Carbon Steel Co., Pittsburgh, and later served as assistant general superintendent for that company. When the company passed out of existence in 1922 he joined the Koppers organization.

Frank J. Oakes, general superintendent of the Dodge Works of Link-Belt Co., Indianapolis, died suddenly at his home recently of apoplexy. He was 54 years old. He was born at Decatur, Ill., and entered the service of the Link-Belt Machinery Co., Chicago, in 1894, as repairman and general machinist. He was a pioneer in developing processes for the heat treatment of steel and held patents on inventions in the chain industry and in other fields.

Coming Events

Sept. 29-Oct. 3, 1930, Pittsburgh, Pa. Annual congress and exposition. National Safety Council, William Penn Hotel. W. H. Cameron, managing director, 20 N. Wacker Drive, Chicago.

October 6-10, 1930, Washington, D. C. Sixth International Road Congress at invitation of the United States Government. Thos. H. McDonald, chief of the United States Bureau of Public Roads, secretary-general of the American Organizing Commission. International Road Exposition in charge of the American Road Builders' Association. Charles M. Upham, engineer - director, National Press Bldg., Washington, D. C.

Nov. 17-19, 1930, Chicago, Ill. Annual meeting, Portland Cement Association, at Blackstone Hotel. Wm. M. Kinney, secretary, 33 W. Grand Ave., Chicago, Ill. (Open to Association members only.)

Dec. 1-5, 1930, Memphis, Tenn. Ninth Annual Asphalt Paving Conference of the Asphalt Institute. Meeting of the Association of Asphalt Paving Technologists in conjunction.

Dec. 1-6, 1930, New York, N. Y. Ninth National Exposition of Power and Mechanical Engineering, to be held at Grand Central Palace. I. E. Moultrop, chairman.

Jan. 19-22, 1931, St. Louis, Mo. Annual Convention National Crushed Stone Assn., Hotel Jefferson. J. R. Boyd, secretary, 1735 14th St., N. W., Washington, D. C.

Jan. 27-29, 1931, St. Louis, Mo. Annual convention National Sand & Gravel Assn., Hotel Jefferson. V. P. Ahearn, executive secretary, Washington, D. C.

Feb. 10-13, 1931, Chicago, Ill. Fifth Midwest Power Engineering Conference. G. E. Pfisterer, secretary, 308 W. Washington St., Chicago.

Feb. 24-27, 1931, Wichita, Kan. Sixth Annual Southwest Road Show and School, Exposition Building. F. G. Wieland, manager, P. O. Box 1043, Wichita, Kan.

July 17-Aug. 28, 1931, Atlantic City, N. J. American Fair, featuring road building, at Auditorium. P. F. Seward, American Road Builders' Assn., Washington, D. C.

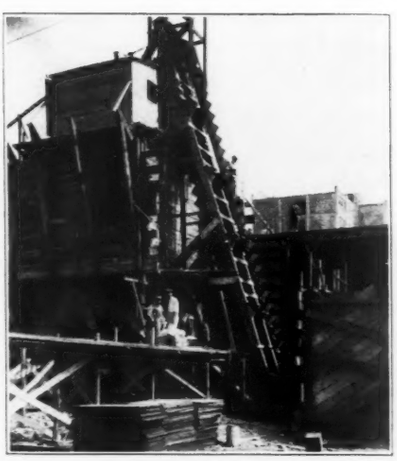
Aggregates for Big Job Handled by Elevators

On the Jersey City waterfront, the Pennsylvania Terminal Co. is erecting three buildings, each nine stories high, approximately 150 ft. wide, and 350 ft. long. The construction is of reinforced concrete and an enormous quantity of concrete aggregates will be handled.

Several days after the concrete construction was started, the conveying system for handling sand and stone to the mixers was found to be inadequate. The George Haiss Mfg. Co. was then called upon with the request that it replace the equipment in use with a satisfactory system in the shortest possible time.

Within two days, two heavy-duty elevators, each having a capacity of 125 cu. yd. per hour, on 50-ft. centers, were supplied to the contractor. A truck ramp, extending to the top of two receiving hoppers, each holding approximately 15 cu. yd. of sand and stone, was already in place. Gates in these hoppers allow the material to be discharged into the elevator buckets and carried up 50 ft. to the top of the elevator where, by a swivel chute, it can be discharged into either side of a 100-ton storage bin mounted directly over the concrete mixer. Cement is unloaded from freight cars to the mixer by means of gravity roller conveyors.

The two elevators are of all-steel construction. The sprockets and elevator chains are of manganese steel,



Elevators facilitate in the manufacture of concrete.

and all gears are of forged or cast steel, with machine-cut teeth. They are driven by two General Electric 20-hp. motors.

Names Gordon Daggett Manager in Wisconsin

Stephens - Adamson Manufacturing Co., conveyor and screen manufacturers of Aurora, Ill., announces Gordon F. Daggett as manager of its Wisconsin territory, with offices at 735 E. Briarwood Place, Milwaukee, Wis.

Mr. Daggett has specialized upon

Gordon F. Daggett

conveying and screening machinery and also upon the design and construction of complete sand, gravel and crushed-stone plants for the past ten years. He is an authority on sampling and testing of concrete aggregates, having made a special study of this phase of the construction industry.

Although several of the screening and crushing plants designed by Mr. Daggett have received considerable publicity, he is also known throughout Wisconsin as a capable designer of conveying and material-handling equipment for industrial plants.

He is a University of Wisconsin graduate and since gaining considerable experience on various power projects on the west coast has spent the past seventeen years in private practice and in various capacities on the Wisconsin Highway Commission. Later, as executive secretary of the Wisconsin Mineral Aggregate Association, he acted as consulting engineer to the forty-eight plants in the Association, which produce approximately 98 per cent of the total commercial tonnage in the Wisconsin territory.

Old Shandon Placers to Be Operated Once More

Operations will be commenced, it is said, within two months on the old Shandon Placers, 25 mi. north of Hatch, N. M. A cement-lined earthen reservoir, about 350 ft. above the level of the sluice boxes, will be filled by a pumping system with water for mining. A Caterpillar tractor will deliver the gravel to a grizzly and the fines will pass to the sluice boxes. The property is said to be financed by J. L. McCullough of El Paso, Tex., and C. H. Taggart, Caballo, N. M.

Foote Bros. Co. Appoints Florida Representative

Foote Bros. Gear and Machine Co., Chicago, Ill., has recently appointed J. L. Hart Machinery Co., Tampa, Florida, representative of the company in Southern Florida.

Financial News

The information contained in these financial pages is given with the understanding that any statement on the part of this magazine or any of its staff, as to the responsibility or standing of any person, firm or corporation, or as to the value of any property or securities is a mere expression of opinion, given as a matter of service to the readers of PIT AND QUARRY, *for which no responsibility in any way is to attach to this magazine or to any of its staff.*

Firmer Prices Boost Net of United States Gypsum

Increase in the first-half net profit of United States Gypsum Co., as compared with last year, reflected results from settlement of the price-cutting competition in the gypsum industry which had caused the company's profits to trend steadily downward over the past several years. Better prices received for products probably accounted for most of the improved profit showing, although low costs made possible by heavy capital expenditures, even during the period of declining profits, together with earnings of new plants put into operation in 1929, contributed.

The first half increase, this year, was the more noteworthy in that it came during a period of slack building operations. While a further decline in building is forecast, the report to stockholders states that reasonably satisfactory earnings seem probable for the remainder of the year.

During the post-war period of building activity, the net profit rose from slightly more than $1,000,000 in 1919 to $8,414,116 in 1925. In subsequent years, price-cutting in the industry exerted more adverse influence on earnings than building conditions. With this condition corrected, Gypsum's profits should recover much of the ground lost during the past few years as soon as building turns for the better.

The balance sheet as of June 30, 1930, shows an exceptionally strong current position, with current assets of over ten times current liabilities and cash and government securities together amounting to almost $7,000,000, against current liabilities of $1,621,617.

In 5½ years, ended June 30 last, Gypsum's investment in plant and equipment, before deduction of reserves, more than doubled. These heavy capital expenditures during a period of declining earnings have served to entrench the company still more solidly in its field. With its mines or quarries in the principal natural gypsum producing areas and plants strategically located with reference to the principal consuming areas, Gypsum is able to manufacture and to distribute its products efficiently and economically.

The company's capital structure is simple, consisting on June 30, 1930, of $7,841,700 7 per cent preferred stock and $23,409,440 common stock. The surplus is $33,075,805. The only items ahead of the capital stock on that date were $1,621,617 current liabilities and $11,807,327 reserves.

Because of stock dividends and rights offerings, the number of common shares outstanding has more than doubled since 1925 and now stands at 1,170,472 shares of $20 par, on which the first-half net profits equaled $2.24 per share or considerably more than the full year's dividend requirements of $1.60 per share.

In line with its conservative accounting methods, under which its large gypsum deposits are said to be carried on the books at a purely nominal figure, Gypsum has pursued the conservative dividend policy of maintaining a relatively low regular cash dividend rate, supplemented by extra cash dividends, stock dividends, or offerings of rights to buy additional stock below the market price.

As the number of shares increased and earnings fell off, the regular cash dividend rate was maintained, but the extras in cash and stock were reduced and finally eliminated. No extra was paid in 1929 and none has been paid this year to date. This policy has enabled Gypsum not only to maintain but to strengthen its balance sheet position and thus to place itself in condition to consider more generous treatment of stockholders as soon as its earnings' trend again turns definitely upward.

Canada Paving & Supply Earns $1.01 Per Share

Canada Paving Supply Corp., engaged in contracting and the sale and transport of sand, gravel and cement, reported, for the 14-months' period ended Jan. 31, 1930, net income of $311,379, equivalent to $1.01 a common share after allowing for first and second preference dividend requirements. This compared with a net of $463,590, equal to $4.47 a common share after preference dividend requirements for the 11-months' period in 1928. Quarterly dividends have been paid regularly on the first preferred stock but no disbursements on the second preference or common stocks have been reported to date.

The balance sheet, dated Jan. 31, 1930, showed a net working capital of $697,845, a decrease of almost 29 per cent from $981,952 on Dec. 1, 1928. Cash was only $8,626; however, receivables had increased from $862,286 in 1928 to $1,501,609 in 1930.

The balance sheet, dated Jan. 31, 1930, indicated a total book value of $144,651 (after allowing for $7 preferred stock at $110 per share) applicable to 60,024 no-par common shares, or $2.41 a share; compared with $1.27 per share on Dec. 1, 1928.

Lehigh Portland Cement Earns 16 Cents a Share

The Lehigh Portland Cement Co. reports, for the year ended Aug. 31, 1930, a net profit of $1,534,477 after depreciation and federal taxes. After deduction of preferred dividends paid, the balance was $72,692, equal to 16c per share (par $50) on 450,348 shares of common stock. This compares with net profit of $3,676,051 or $4.81 per share on the common stock earned in the preceding year.

CURRENT DIVIDENDS

COMPANY	CLASS OF STOCK	DIVIDEND RATE	HOLDERS OF RECORD	PAYABLE	COMPANY	CLASS OF STOCK	DIVIDEND RATE	HOLDERS OF RECORD	PAYABLE
Alpha Portland Cement	Preferred	1¾% qr.	Sept. 1	Sept. 15	Metropolitan Paving Brick	Preferred	$1.75 qr.	Sept. 15	Oct. 1
Canada Cement	Preferred	1⅝%qr.	Aug. 28	Sept. 30	Metropolitan Paving Brick	Common	$0.50 qr.	Aug. 15	Sept. 1
Canada Paving and Supply	1st Pfd.	1¾% qr.	Aug. 15	Sept. 1	National Brick of La Prairie	Preferred	$0.75 qr.	Aug. 31	Sept. 15
Cleveland Stone Quarries	Common	$0.75 qr.	Aug. 15	Sept. 1	Newaygo Portland Cement	Preferred	$1.75 qr.	Sept. 26	Sept. 30
Cleveland Stone Quarries	Common	$0.25 extra	Aug. 15	Sept. 1	New York Trap Rock	Preferred	$1.75 qr.	Sept. 20	Oct. 1
Cleveland Builders Supply	Common	$0.50 qr.	Sept. 15	Oct. 1	Peerless Cement	Preferred	$1.75 qr.	Sept. 20	Sept. 30
Consumers Co	Pr. Pfd.	$1.50 qr.	Sept. 15	Oct. 1	Raybestos-Manhattan	Common	$0.65 qr.	Sept. 2	Sept. 15
General Asphalt	Common	$1.00 qr.	Aug. 28	Sept. 15	Superior Portland Cement	Class A	$0.27½m	Sept. 23	Oct. 1
Indiana Limestone	Preferred	1¾% qr.	Aug. 20	Sept. 1	Texas Gulf Sulphur	.....	$1.00 qr.	Sept. 3	Sept. 15
International Cement	Common	$1.00 qr.	Sept. 11	Sept. 30	United States Gypsum	Preferred	$1.75 qr.	Sept. 15	Sept. 30
International Salt	Com. (new)	$0.75 qr.	Sept. 15	Oct. 1	United States Gypsum	Common	$0.40 qr.	Sept. 15	Sept. 30
Johns-Manville	Preferred	$1.75 qr.	Sept. 11	Oct. 1	Virginia-Carolina Chemical	Pr. Pfd.	1¾% qr.	Aug. 17	Sept. 1
Johns-Manville	Common	$0.75 qr.	Sept. 25	Oct. 15	Warner Co	1st Pfd.	$1.75 qr.	Sept. 15	Oct. 1
Kentucky Rock Asphalt	Preferred	1¾% qr.	Aug. 15	Sept. 3	Warner Co	2nd Pfd.	$1.75 qr.	Sept. 15	Oct. 1
Lawrence Portland Cement	.....	1% qr.	Aug. 31	Sept. 15	Warner Co	Common	$0.50 qr.	Sept. 30	Oct. 15
Material Service Corp	.....	$0.50 qr.	Aug. 15	Sept. 1	Warner Co	Common	$0.25 extra	Sept. 30	Oct. 15

Latest Portland-Cement Statistics

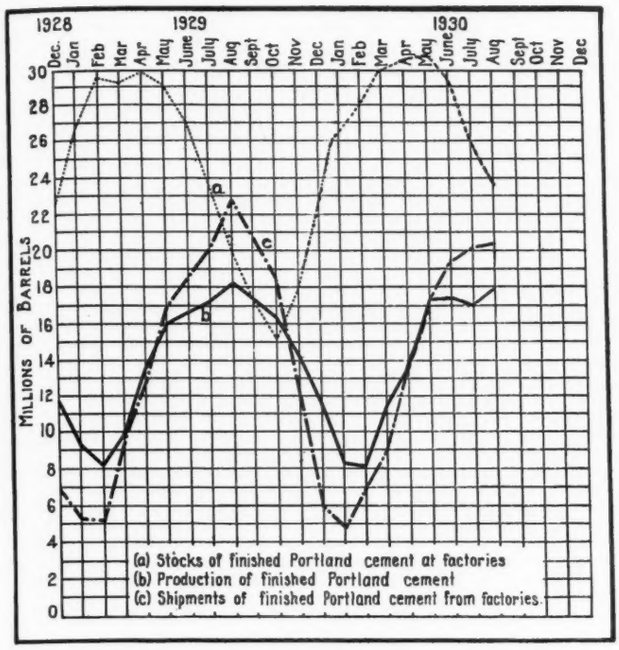

1928
1929
1930
Dec. Jan Feb Mar Apr May June July Aug Sept Oct Nov Dec Jan Feb Mar Apr May June July Aug Sept Oct Nov Dec
MILLIONS OF BARRELS
30 28 26 24 22 20 18 16 14 12 10 8 6 4 2 0
a
b
c
(a) Stocks of finished Portland cement at factories
(b) Production of finished Portland cement
(c) Shipments of finished Portland cement from factories

Chart showing production, shipments, and stocks on hand of finished Portland cement, by months—December, 1928, to August, 1930.

The Portland-cement industry in August, 1930, produced 17,821,000 bbl., shipped 20,299,000 bbl. from the mills, and had in stock at the end of the month 23,810,000 bbl., according to the United States Bureau of Mines, Department of Commerce. The production of Portland cement in August, 1930, showed a decrease of 4.1 per cent and shipments a decrease of 11.9 per cent, as compared with August, 1929. Portland-cement stocks at the mills were 18.7 per cent higher than a year ago.

The statistics here presented are compiled from reports for August, from all manufacturing plants except two for which estimates have been included in lieu of actual returns.

In the accompanying statement of relation of production to capacity the total output of finished cement is compared with the estimated capacity of 166 plants at the close of August, 1930, and of 164 plants at the close of August, 1929. In addition to the capacity of the new plants which began operating during the twelve months ended August 31, 1930, the estimates include increased capacity due to extensions and improvements at old plants during the period.

EXPORTS OF HYDRAULIC CEMENT BY COUNTRIES IN JULY, 1930

Exported to—	Barrels	Value
Canada	4,521	$19,428
Central America	4,722	12,138
Cuba	5,613	13,928
Other West Indies and Bermuda	6,952	14,302
Mexico	6,768	21,975
South America	14,036	60,205
Other Countries	4,470	24,601
	47,082	$166,577

DISTRIBUTION OF CEMENT

Shipped to—	June		July	
	1929	1930	1929	1930
Alabama	156,828	124,375	227,381	137,184
Alaska	1,564	2,961	2,307	1,774
Arizona	76,157	41,057	46,241	34,382
Arkansas	149,067	175,644	181,615	184,225
California	981,611	844,399	905,437	846,508
Colorado	105,289	110,203	107,528	92,898
Connecticut	192,236	191,348	213,551	191,178
Delaware	45,544	59,042	43,016	68,752
District of Columbia	110,966	80,561	118,426	87,492
Florida	91,946	89,285	99,338	105,993
Georgia	117,783	142,722	157,113	147,652
Hawaii	22,254	15,182	21,348	18,164
Idaho	31,802	31,356	33,383	51,059
Illinois	1,780,688	1,212,319	1,835,790	1,495,891
Indiana	635,341	820,836	745,533	864,425
Iowa	728,393	1,126,961	809,784	1,184,588
Kansas	229,267	245,344	225,611	226,827
Kentucky	164,656	115,398	187,060	223,147
Louisiana	113,837	306,306	117,311	308,306
Maine	65,594	89,475	73,594	95,005
Maryland	244,635	267,222	305,219	274,298
Massachusetts	293,455	286,925	335,635	324,874
Michigan	1,486,439	1,164,439	1,677,282	1,253,055
Minnesota	456,148	627,906	478,941	647,064
Mississippi	73,548	51,847	109,161	66,721
Missouri	567,722	727,279	725,967	737,463
Montana	82,861	42,565	67,366	37,429
Nebraska	152,570	235,023	150,214	210,545
Nevada	14,091	16,830	10,841	15,694
New Hampshire	73,359	75,978	98,708	80,647
New Jersey	909,551	763,411	877,662	788,857
New Mexico	32,003	30,382	25,281	31,722
New York	2,493,401	2,331,986	2,596,425	2,474,955
North Carolina	179,957	111,543	171,148	108,620
North Dakota	81,746	63,127	69,425	53,178
Ohio	1,192,848	1,119,351	1,236,231	1,294,504
Oklahoma	286,697	353,241	323,528	362,973
Oregon	95,717	99,177	101,161	116,047
Pennsylvania	1,467,886	1,793,487	1,565,726	1,915,236
Porto Rico	2,800	250	7,702	8,250
Rhode Island	72,067	75,394	73,134	66,903
South Carolina	126,369	83,713	140,609	185,517
South Dakota	64,846	73,344	61,786	82,598
Tennessee	341,140	284,045	435,944	267,623
Texas	675,511	630,469	741,455	644,850
Utah	59,003	47,830	43,737	38,485
Vermont	130,517	72,329	145,097	112,145
Virginia	187,160	156,599	194,236	182,631
Washington	244,546	347,994	263,893	330,911
West Virginia	153,996	174,962	194,649	199,923
Wisconsin	786,307	751,985	823,678	810,875
Wyoming	27,961	25,877	21,230	23,380
Unspecified	21,536	5,268	40,750	0
	18,879,216	18,716,552	20,265,188	20,113,423
Foreign countries	69,784	64,448	53,812	39,577
Total shipped from cement plants	18,949,000	18,781,000	20,319,000	20,153,000

IMPORTS OF HYDRAULIC CEMENT BY COUNTRIES AND BY DISTRICTS, IN JULY, 1930

Imported from—	Districts into which Imported	Barrels	Value
Canada	Maine and New Hampshire	198	$ 626
	Vermont	7	18
	Total	205	$ 644
Denmark	Porto Rico	5,215	6,638
France	New York	3,581	6,298
Germany	Los Angeles	660	4,032
Japan	Hawaii	253	267
United Kingdom	New York	2,490	3,094
	Grand Total	12,404	$20,973

RELATION OF PRODUCTION TO CAPACITY

	August		July	June	May
	1929 (*per cent*)	1930 (*per cent*)	1930 (*per cent*)	1930 (*per cent*)	1930 (*per cent*)
The month	86.1	81.0	77.8	81.4	78.9
The 12 months ended	68.2	65.6	66.1	66.4	66.2

PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT, BY MONTHS, IN 1929 AND 1930 (*In thousands of barrels*)

Month	Production		Shipments		Stocks at End of Month	
	1929	1930	1929	1930	1929	1930
January	9,881	8,498	5,707	4,955	26,797	27,081
February	8,522	8,162	5,448	7,012	29,870	28,249
March	9,969	11,225	10,113	8,826	29,724	30,648
April	13,750	13,521	13,325	13,340	30,151	30,867
May	16,151	17,249	16,706	17,224	29,624	30,891
June	16,803	17,239	18,949	18,781	27,505	29,364
July	17,315	17,078	20,319	20,153	24,525	26,289
August	18,585	17,821	23,052	20,299	20,056	23,810
September	17,223	.....	19,950	.....	17,325	.....
October	16,731	.....	18,695	.....	15,381	.....
November	14,053	.....	11,222	.....	18,213	.....
December	11,215	.....	5,951	.....	23,550	.....
	170,198	.....	169,437	.....	.....	.....

PRODUCTION AND STOCKS OF CLINKER, BY MONTHS, IN 1929 AND 1930 (*In thousands of barrels*)

Month	Production		Stocks at End of Month		Month	Production		Stocks at End of Month	
	1929	1930	1929	1930		1929	1930	1929	1930
January	12,012	10,504	9,642	9,646	July	15,214	15,067	11,619	11,682
February	11,255	10,008	12,436	11,572	August	15,829	15,237	8,995	9,302
March	12,450	13,045	14,948	13,503	September	15,165	.....	7,009	.....
April	14,166	15,025	15,479	15,164	October	15,515	.....	5,934	.....
May	15,444	16,607	14,911	14,668	November	14,087	.....	6,134	.....
June	15,312	15,895	13,587	13,452	December	12,539	.....	7,526	.....

PRODUCTION AND STOCKS OF CLINKER, BY DISTRICTS, IN AUGUST, 1929 AND 1930 (*In thousands of barrels*)

District	Production		Stocks at End of Month	
	1929	1930	1929	1930
Eastern Pa., N. J., and Md	3,544	3,273	1,653	1,610
New York and Maine	1,114	1,136	704	496
Ohio, Western Pa., and W. Va	1,742	1,511	878	972
Michigan	1,339	1,092	804	1,027
Wis., Ill., Ind., and Ky	1,788	1,859	967	1,380
Va., Tenn., Ala., Ga., Fla., and La	1,240	1,220	816	917
Eastern Mo., Ia., Minn., and S. Dak	1,384	1,608	667	587
W. Mo., Nebr., Kans., Okla., and Ark	1,216	1,271	414	276
Texas	770	701	255	299
Colo., Mont., Utah, Wyo., and Idaho	263	342	365	270
California	1,121	860	1,005	1,020
Ore. and Wash	306	364	467	448
Totals	15,829	15,237	8,995	9,302

PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT, BY DISTRICTS, IN AUGUST, 1929 AND 1930, AND STOCKS IN JULY, 1930 (*In thousands of barrels*)

District	August						Stocks at End of July
	Production		Shipments		Stocks at End of Month		
	1929	1930	1929	1930	1929	1930	1930
Eastern Pa., N. J., and Md	3,941	3,676	4,584	4,161	4,777	5,506	5,992
New York and Maine	1,449	1,396	1,747	1,560	1,467	1,298	1,462
Ohio, Western Pa., and W. Va	2,180	2,009	2,464	2,338	3,152	3,194	3,523
Michigan	1,582	1,426	2,290	1,627	1,238	2,418	2,618
Wis., Ill., Ind., and Ky	2,425	2,409	3,275	3,045	2,318	3,295	3,931
Va., Tenn., Ala., Ga., Fla., and La	1,450	1,232	1,644	1,328	1,623	1,794	1,889
Eastern Mo., Ia., Minn., and S. Dak	1,578	1,933	2,589	2,491	2,081	1,937	2,495
W. Mo., Nebr., Kans., Okla., and Ark	1,430	1,361	1,773	1,412	926	1,637	1,688
Texas	707	697	786	634	466	627	564
Colo., Mont., Utah, Wyo., and Idaho	357	302	368	292	518	510	501
California	1,128	922	1,123	961	997	1,104	1,144
Ore. and Wash	358	458	409	450	493	490	482
Totals	18,585	17,821	23,052	20,299	20,056	23,810	26,289

EXPORTS AND IMPORTS OF HYDRAULIC CEMENT, BY MONTHS, IN 1929 AND 1930

Month	Exports				Imports			
	1929		1930		1929		1930	
	Barrels	Value	Barrels	Value	Barrels	Value	Barrels	Value
January	78,639	$283,002	82,387	$293,135	151,302	$177,976	201,609	$207,461
February	58,886	225,590	64,267	217,798	118,930	123,123	114,455	119,717
March	69,079	235,164	117,563	357,896	131,909	112,788	43,622	59,981
April	64,145	218,316	57,419	200,217	89,668	114,281	140,871	178,226
May	57,955	219,366	57,423	198,170	200,646	267,854	94,696	111,998
June	96,055	287,612	82,077	223,639	203,545	228,170	55,356	74,370
July	71,992	247,177	47,082	166,577	182,098	199,960	12,404	20,973
August	60,013	225,762	.....	.....	183,938	199,403	.....	.....
September	86,268	308,631	.....	.....	112,372	152,239	.....	.....
October	101,359	337,839	.....	.....	172,566	187,504	.....	.....
November	53,378	198,197	.....	.....	96,568	95,844	.....	.....
December	88,403	297,255	.....	.....	84,358	79,098	.....	.....
Totals	886,172	$3,083,911	.....	.....	1,727,900	$1,938,240	.....	.....

Exhibits Manometers, Flow Meters at Exhibit

Among the booths which attracted considerable attention at the Power Show held at Cleveland, September 8-12, were those containing the display of the Meriam Co., Cleveland. The chief feature was demonstrations showing the many possibilities of what is almost the oldest form of basic instruments for measuring pressures—U-tube and well-type manometers. Working models showing methods of measuring the pressure or flow of liquids or gasses in pipe lines were displayed, and a wide range of types and sizes of instruments ranging from giants over 9 feet high down to small instruments which would fit the pocket, were on view. Testers for gas and oil wells and other special applications of the manometer and flow meter equipment were also features.

The flashing sign at the back of the booth also created considerable interest. It consisted of a double screen, about a yard square, of manometer tubes filled with variously tinted solutions, and was illuminated from the back, giving an unusual and pleasing effect.

Traffic News and Comment

New Commodity Rates Asked on Coated Stone

A shipper of crushed stone, coated with oil, tar or asphaltum, has asked the carriers to establish a new line of commodity rates from Pittsburgh, Pa., to various destinations in Pennsylvania, Ohio and West Virginia. The subject is covered by Central Freight Assn. docket 25,969.

The proposed rates to representative destinations are as follows:

To	
Wilmerding, Pa.	$0.96
McKeesport, Pa.	.96
Jeannette, Pa.	1.07
Natrona, Pa.	1.07
Beaver Falls, Pa.	1.07
Washington, Pa.	1 07
Monongahela, Pa.	1.07
Donora, Pa.	1.07
Vandergrift, Pa.	1.07
Collier, W. Va.	1.07
Latrobe, Pa.	1.19
Wampum, Pa.	1.19
Steubenville, O.	1.19
Kittanning, Pa.	1.19
New Castle, Pa.	1.19
Butler, Pa.	1.19
Connellsville, Pa.	1.19
Lowellville, O.	1.19
Chester, W. Va.	1.30
Wheeling, W. Va.	1 30
Youngstown, O.	1.30
Benwood, W. Va.	1.30
Salem, O.	1.30
Sharpsville, Pa.	1.30
Cadiz, O.	1.30
Johnstown, Pa.	1.42
Warren, O.	1.42
Alliance, O.	1.42
Uhrichsville, O.	1.42
Canton, O.	1.53
Newcomerstown, O.	1.53
Massillon, O.	1.53
Dover, Pa.	1.53
Altoona, Pa.	1.53
Coshocton, O.	1.53
Ashtabula, O.	1.53
Akron, O.	1.76
DuBois, Pa.	1.76
Oil City, Pa.	1.76
Cleveland, O.	1.76
Erie, Pa.	1.76
Marietta, O.	1.99

Proposed I. C. C. Report to Include New Rulings

Proposed reports of the Interstate Commerce Commission will include the following recommendations:

Docket No. 23122—Macdougald Construction Co. Reparation recommended on finding the rate on slag from Woodward, Ala., to Waycross, Ga., unreasonable to the extent that it exceeds $1.85 per net ton.

Docket No. 23382—Highland-Western Glass Co. Dismissal recommended on finding the rate of $2.10 per net ton on glass sand, Berkley Springs, Great Cacapon and Hancock, W. Va., to Washington, Pa., not unreasonable.

Docket No. 23332—Medusa Portland Cement Co. Dismissal recommended on finding the rate on Portland cement from Bay Bridge, O., to York, Pa., not unreasonable.

Docket No. 22779—Richmond Mica Corp. Dismissal recommended on finding rates on ground mica from Richmond, Va., to Norfolk and Newport News, Va., for export not unreasonable. Prescribed class rates under the general revision should apply in lieu of commodity rates.

Docket No. 23168—Blue Diamond Co. Recommended that the rate on gypsum from Arden, Nev., to Monolith, Cal., is, and for the future will be, unreasonable to the extent that it exceeds or may exceed 12 cents per 100 lb. minimum weight 80,000 pounds and unduly preferential to producers of gypsum at Midland and Plaster City, Cal., and of intrastate commerce, and unduly prejudicial to complainant and to interstate commerce to the extent that it exceeds or may exceed the rates in effect from Midland and Plaster City.

Docket No. 23157—Smoot Sand & Gravel Co. Recommended that rates on sand and gravel from Georgetown, D. C., to points in Maryland, Pennsylvania, Virginia and West Virginia be found unreasonable to the extent that they exceed or may exceed rates on a mileage scale beginning with 65 cents for 20 miles and under and progressing upward to $2.00 for 350 miles and over 320 miles. The scale of rates for single line hauls there is to be added 20 cents for joint line hauls.

Oppose Class Rates in Petition to Commission

The Trunk Line, Central Freight Association and New England carriers are not satisfied with the decision of the Interstate Commerce Commission in Docket No. 15879 and have filed a petition asking that the report be modified.

The carriers deny that their revenue will be increased, and on the other hand contend that their revenues stand to be reduced.

Prior to the Commission decision, a revenue study was made to determine just what the effect would be under the proposed rates. The carriers contend that such study cannot be considered as giving a proper indication of the effect of the new rates and under the present conditions.

The carriers' petition is directed toward the fifth and sixth class rates which are 35 per cent and 27½ per cent of first class, declaring that the new level prescribed will make reductions which would not be offset by increases in the other classes.

This general readjustment has been an issue for many years and we cannot imagine that the Commission will further prolong the subject with a stay of their order and a further investigation although such may be the result of the carriers' petition.

Illinois Gravel Producer Desires New Iowa Rates

Western Trunk Line Committee docket 2,898-H covers an application filed by a shipper seeking reduction in the present rates on sand and gravel, carloads, from Forreston, Ill., to various Illinois Central R. R. destinations in Iowa. Present rates as well as proposed rates to various representative points are shown below:

To	Present Rate	Proposed Rate
Dyersville, Ia.	$1.40	$1.15
Manchester, Ia.	1.50	1.20
Waterloo, Ia.	1.60	1.45
Cedar Rapids, Ia.	1.60	1.45
Cedar Falls, Ia.	1.70	1.45
Iowa Falls, Ia.	1.80	1.55

Producers of Foundry Sand Seek Lower Rates

Producers of foundry sand have retained Charles E. Vose, 80 Federal Street, Boston, Mass., to represent them before the Interstate Commerce Commission in hearings which commenced Sept. 9 on freight rates to points in Atlantic Seaboard States. It is contended that high freight rates are tending to restrict shipments of sand from New Jersey districts and Albany, N. Y. The sand shippers who are attempting to secure a downward revision of rates are the New Jersey Silica Sand Co., Millville, N. J.; George F. Pettinos, Philadelphia; Paxson-Taggart, Inc., Philadelphia; Whitehead Brothers, New York; Albany Sand & Supply Co., Albany, N. Y.

Lehigh Portland Cement Attacks Rates on Coal

Charging Eastern coal rates "are beyond all reason," E. S. Gubernator, of the Lehigh Portland Cement Co., presented statistics at an Interstate Commerce Commission hearing at Washington, D. C., recently designed to support the contention of the Central Pennsylvania Coal Producers' Association that excessive charges are being made by the carriers.

"Coal rates in Eastern trunkline territory as a class are the highest coal rates found east of the Rocky Mountains, including Western trunkline territory, Central and Illinois territory," Mr. Gubernator declared.

He submitted statistics he had completed showing comparisons of Eastern rates with those charged in other territories, together with voluminous charts and data on distances, hauls and differentials.

Review of Foreign Practice

Continues Studies Upon Series of Old Mortars

Continuing a series of reports previously published (*Tonindustrie-Zeitung* 1927, p. 139 ff., 1928, p. 346 ff., and 1929, p. 449 ff.) Dr. Karl Biehl reports in two articles on chemical analyses and microscopic studies of two series of old mortars, one a group of old German mortars and one consisting of two samples of mortars from excavations at Ctesiphon in Persia. The investigations of the old German mortars bring to light nothing particular in the way of practice not already known, but show that well developed rules of proportioning were used even in the earliest of them. Trass admixtures do not occur until the later mortars. The two samples from Persia are of different kinds, one being a gypsum mortar made without sand as is usual today among the Arabs, the other a lime mortar with aggregate of brick dust—a practice apparently borrowed from the Romans, since all earlier mortars in that region were of gypsum.—*Tonindustrie-Zeitung* 54:839-841 and 877-878, June 26 and July 3, 1930.

European Development of Tube-Mill Drives

The principal influences in the development of drives for tube mills since their introduction (about 1890) to the present day have been, on one hand, the desire for a positive and efficient drive and, on the other, the rapid increases in the mill sizes and power consumption. The customary way to put the mill in motion, today as it was in the 90's, is by means of a girth gear-ring around the mill shell, driven by a pinion on a drive shaft; but this has not been an advantageous drive, since the introduction of mills using 400 to 800 hp., partly because of the great size and weight of the gears required and the fact that only the best quality steels can be used for transmitting such large amounts of power in this way, and partly because of the wear on the gear teeth and the uneven operation of the mill when, as is often the case, the wear on the teeth is not uniform. The methods of transmitting power to the drive shaft of this device have varied since the early days. The first method was the belt drive in which the belt was slipped from an idler pulley to a driving pulley to put the mill in motion. Then followed the belt-drive, using a friction clutch. About 1900, slow-speed motors came into use and found rather wide acceptance in spite of comparatively high cost and rather low efficiency. Later, these gave way to the higher-speed motors that drive through reduction gears.

The author of this article says that the disadvantages of the girth gear drive have been eliminated by the "Centra" drive of the Krupp "Centra" compound mills, introduced about six years ago, in which power is transmitted from the motor, through a flexible coupling, to precision reduction gearing and, from the gears, through a coupling spindle, to a shaft concentric with the mill barrel, the coupling spindle serving to compensate for variations in the horizontal or vertical alignment of the mill with the reduction gears. This drive is said to be the first completely flexible drive, to be smooth-running and uniform in its load requirements, and low in power consumption. It has also the advantage that all gearing as well as the motor can be placed in a dust-tight room separate from the mill.—Ing. L. Thieme in *Tonindustrie-Zeitung* 54: 690,693, May 22, 1930.

Silicate Modulus—Its Effect on Kiln Output

The opinion is often expressed that sharp differences in the silica content of the raw mix hinder considerably the operation of kilns, and particularly rotary kilns, at highest capacity. The author of this article cites a case which indicates that this opinion is without foundation. In this case the raw material is essentially a marl with different strata varying in their silica content, so that a sorting and mixing is necessary, and, in working back in the quarry, new conditions are continually arising. In a series of observations covering a three-weeks period, the silicate modulus varied between 2.25 and 4. In checking the results of operation during this period, it was found that the production (using a Unax kiln with chains) was excellent and a full 25 per cent above the guaranteed capacity. The clinker produced was deep black and hard, and the cement was high-strength. With a silicate modulus of 3 to 3.5, no formation of rings was observed, but when the figure went below 3, rings were formed.—O. Frey in *Zement* 19:744-745, August 7, 1930.

Production of Concrete in Early Roman Period

It is a widespread, erroneous belief that concrete was first produced in the nineteenth century, after the discovery of cement, a belief strengthened by the fact that so much of the earlier building was done with broken stone, natural building block, brick, and the like. However, a kind of concrete was produced by the Romans and quite widely used. They used for the mixing of the concrete (just as we do today) coarse gravel from tertiary deposits and stream valleys or small crushed rock from quarries, columnar basalt, or broken brick. As cementing material they used, both in Italy and in the German Rhineland, lime burned with charcoal, and, as an admixture, the volcanic trass, the chemical and hydraulic properties of which they learned through experience in Italy in very early times. This material is found extensively in parts of Germany, and the trass mills were used for this purpose well through the middle ages.

Many remains of concrete produced with lime, trass and aggregate are found in Germany and in a well preserved condition after the action of weathering for centuries.—Theodor Wildeman in *Baugewerbe und Kunststein* (Berlin) 2:52-53, May 31, 1930 (bound with *Deutsche Kunststein und Zementwaren-industrie* 3, No. 10).

New Process for Lining Kilns Used in Germany

The process of lining rotary kilns with refractory bricks in the upper section of the kiln ordinarily requires each brick to be propped separately until the last brick is placed, this method being slow, expensive and rather dangerous. The disadvantages of this method are avoided by the use of a new apparatus, on which a patent has been applied for in Germany, known as the "Keilfest" kiln-lining bridge. It consists of movable rods *a* supporting the chennels *b* on which rests the arch from which the bricks are placed. The bricks are laid on this arch and moved up into place inside the kiln shell by wedges as shown in the illustration. This apparatus is said to do the work quickly and without danger to workmen, and can be pushed along as fast as the successive courses of bricks are laid.—*Tonindustrie-Zeitung* 54:816, June 19, 1930.

Pulverized-Coal Firing in Small German Plant

Although firing with pulverized coal has become common in the larger plants, its economy and convenience have not been so easily available to smaller plants. An interesting small plant in Germany that uses pulverized coal as fuel is not even large enough to justify a grinding installation, and the pulverized coal is received in special cars and unloaded pneumatically. Eight furnaces that are fired by pulverized coal are fed by the same pneumatic conveying system, and one man from his station can unload a 25-ton car per hour and supply coal to all of the furnace storage bins.—*Revue des Materiaux de Construction*, June, 1930, pp. 234-235.

Recent Patents

AMERICAN

Cement and Concrete

Process of and apparatus for burning cement in rotary kilns. Otto Lellep, Berlin, Germany. No. 1,775,313.

Manufacture of alumina cement. Bela Spiegl, Budapest, Hungary. No. 1,775,575.

Apparatus for apportioning the ingredients of mixtures. William M. Venable, Pittsburgh, Pa., assignor to Blaw-Knox Co. No. 1,775,609.

Handling Material

Method of making piles in place. Joseph H. Thornley, Chicago, Ill., assignor for Western Foundation Co., same place. No. 1,775,217.

Boom-hoist safety means. Erich H. Lichtenberg, Milwaukee, Wis., assignor to Koehring Co., same place. No. 1,775,435.

Screening

Screen. George E. Krider, Duncanville, Pa., assignor to McLanahan-Stone Machine Co., Hollidaysburg, Pa. No. 1,774,893.

FOREIGN

Blasting

Blasting cartridge. D. Hodge. British 332,196.

Cement

Magnesian cement and method of manufacturing the same. J. C. G. Sperni. British 332,282.

Manufacture of cement. F. S. Watt. British 332,322.

Improvements in the manufacture of cements. National Building Materials Ltd. French 690,967.

Process for utilization of the steam formed in the production of cement by the wet process. Antoni Eiger. German 504,965.

Concrete

Apparatus for the calculation of reinforced concrete. W. Sabatini. British 331,819.

Ferro-concrete construction. W. G. Goldsmith. British 331,907.

Coolers

Cooler for rotary kiln. Societe d'Exploitation des Procedes Industriels Candlot. German 504,585.

Crushing and Grinding

Gyratory crushers. W. W. Triggs (Traylor Engineering & Manufacturing Co.) British 332,348.

Device for regulating the amount of flow or rate of feed of powdered, granular or lump material in conjunction with crushing or pulverizing mills and the like. British Rema Manufacturing Co., Ltd. and P. Howden. British 332,382.

Pulverizing apparatus. Chauffe & Combustion Soc. Anon. French 691,220.

Cone crusher. Friedr. Krupp Grusonwerk Akt.-Ges. German 504,849.

Pan crusher. Peter Joseph Spengler and Johann Peter Spengler. German 504,850.

Grinding apparatus. Curt von Grueber Maschinenbau Akt.-Ges. German 504,890.

Grinding mill. William Frederick Carr-Hill. German 504,666.

Device for crushing-roll mills. Heinr. Frigge. German 504,851.

Separating screen wall for tube mills and the like. Arno Andreas. German 504,852.

Regulating device for mills. Arca-Regler Akt.-Ges. German 505,285.

Ball mill. Zeitzer Eisongiesserei und Maschinenbau Akt.-Ges. German 505,103.

Grinding device with preliminary screening of the material in the feeding device for a tube mill. Berg & Co. Ges fuer Industrie—Ofenbau und Feuerungsbedarf m. b. H. German 505,185.

Fine-grinding apparatus with one revolving and one fixed grinding roller. Rol, Lister & Cie. German 505,286.

Grinding or crushing mills. G. H. Robinson. British 331,877.

Grinding machines. L. Kellenberger. British 312,176.

Apparatus for grinding and pulverizing. Macao-Walzenmuehlen G. m. b. H. French 690,236.

Grinding and mixing apparatus for sand and similar materials. H. S. Simpson. French 690,693.

Apparatus for pulverizing and treating materials. Erie City Iron Works (Walter Jacob Wohlenberg). Canadian 302,311.

Apparatus for separating lighter from heavier materials in mills. Claudius Peters. German 503,547.

Roller crushing mill. G. Polysius Akt.-Ges. German 503,661.

Ball mill. John Mullin. German 503,662.

Crushing roll with swing hammers for grinding mills. Friedr. Krupp Grusonwerk Akt.-Ges. German 504,160.

Colloid mill. Roehm & Haas Akt.-Ges. German 504,138.

Drilling

Valve for rock drills. Ingersoll-Rand Co. Canadian 302,582.

Underwater drill. Ingersoll-Rand Co. German 503,590.

Deep drilling device. Franz Bade. German 503,982.

Deep drilling device. Arthur T. Beazley. German 503,893.

Apparatus for sample taking, particularly from shafts and bore holes. Siemens - Schuckertwerke Akt. - Ges. German 504,338.

Drilling tool. Sullivan Machinery Co. Canadian 302,853.

Drying

Drying kilns. International General Electric Co., Inc. British 332,491.

Rotary dryer. Brenno Schilde Maschinenbau Akt.-Ges. German 505,193.

Dryer. Werner Brunnschweiler. German 505,017.

Dryer. Hermann Haas. German 504,587.

Excavating

Excavating machine. Adam Clark. Canadian 302,681.

Air shovel. Thomas A. O'Neil. Canadian 302,722.

Filters

Filter cake discharger. Oliver United Filters, Inc. Canadian 302,833.

Gypsum

Apparatus for manufacturing plaster wallboard. Certain-Teed Products Corp. Canadian 302,993.

Kilns

Kilns. H. M. Robertson. British 305,025.

Continuous kilns. H. M. Robertson. British 332,619.

Rotary kilns. E. G. Stone. British 332,682.

Rotary kiln. R. P. E. Roman and T. Lafitte. French 690,919.

Device to prevent irregular burning of calcined materials, particularly of lime, dolomite and the like in shaft kilns. Wilhelm Eckhardt and Ernst Hotop g. m. b. H. German 505,013.

Discharge hopper for rotary kilns for the calcining and fusing of materials of all kinds. Friedr. Krupp Grusonwerk Akt.-Ges. German 504,966.

Fuel feeder for annular kilns and the like. Adolf Auer & Co. German 504,988.

Driving device for continuously operating discharge grate for shaft kilns. Firma E. Schwenk. German 504,989.

Process for production of cement, lime and the like in shaft kiln in which material is blown into the kiln from above and fuel and air from below. August Bues. German 505,258.

Feeding device for shaft kilns. Dipl.-Ing. Ernest Knoeringer and Karl Wolsky. German 505,096.

Material Handling

Driving mechanism for conveyors. W. A. Morton. British 332,271.

Conveyor chains. J. S. Da Costa. British 332,488.

Mechanism for imparting motion to conveyors of the jigging type. Mavor & Coulson, Ltd., and J. B. Mavor. British 332,610.

Dump cars. E. Wirz. British 332,867.

PIT AND QUARRY *will furnish, at its actual cost, a copy of any patent cited above. A charge of ten cents per copy is made by the U. S. Patent Office, Washington, D. C., and readers may procure a copy directly by addressing the Commissioner of Patents, with payment for copies requested. Postage stamps are not accepted by the Patent office. We will endeavor to obtain copies of foreign patents for our readers but we cannot give assurance in every case for the reason that copies of such patents are not printed for distribution as liberally as are the American copies, nor is there a fixed charge per copy.*

Pneumatic conveying device. Soc. Anon des Etablissements Neu. French 691,139.

Apparatus for feeding and metering pulverulent or granular materials. Fuller-Lehigh Co. Canadian 302,806.

Apparatus for feeding pulverized materials from receptacles. B. & L. Powdered Fuel, Ltd. Canadian 302,-973.

Conveying mechanisms. A. E. White (Morgan Construction Co.) British 331,017.

Conveyors. E. P. W. Muschamp and Mining Engineering Co., Ltd. British 331,101.

Skip hoists. Humphreys & Glasgow, Ltd., and J. E. G. Freyer. British 331,319.

Pneumatic transporting of pulverulent materials. E. J. L. F. Constantin. British 331,322.

Gravity runways or conveyors. W. R. Thompson. British 331,386.

Pit tubs, wagons and the like. C. A. Heathcote. British 331,421.

Screw conveyor. R. H. Grandseigne. French 689,181.

Rotating mechanism for cranes. Demag Akt.-Ges. French 689,316.

Process and equipment for pneumatic transportation of materials. J. Schmied. French 689,523.

Apparatus for lifting and transporting loads. Humphreys & Glasgow, Ltd. French 689,623.

Device for automatic coupling of carriages for aerial monocable tramways. P. Klein. French 689,669.

Apparatus for emptying bins by means of two conveyors at right angles. Bamag Meguin Akt.-Ges. French 689,695.

Apparatus for handling and storing. Harnischfeger Corp. Canadian 302,118.

Shaking trough conveyor. Gebr. Hinselmann. G.m.b.H. German 501,933.

Railway car dumper for fine coal or the like, with suction dust-removing apparatus. Maschinenfabrik Augsburg-Nuernberg Akt.-Ges. German 501,934.

Side dumper for pit cars. Walter Moll. German 503,311.

Vessel for conveying materials of all sorts. Vereinigte Stahlwerke Akt.-Ges. German 502,759.

Drive for belt conveyors on small cars. Schenck und Liebe-Harkort Akt.-Ges. German 502,639.

Drive for belt conveyors. Tage Georg Byborg, Mark Frederick Higgins and the Mining Engineering Co., Ltd. German 502,509.

Device for preventing side movement of belt conveyors. Luebecker Maschinenbau-Gesellschaft. German 502,640.

Conveying apparatus. J. Pohlig Akt.-Ges. German 502,761.

Belt conveyor installation. Schenck und Liebe Harkort Akt.-Ges. German 502,642.

Bin for bulk material. Dipl.-Ing. Robert Thome. German 502,518.

Mixers

Concrete mixing machines. S. Dunlop (Koehring Co.) British 332,428.

Concrete mixing machines. K. Piehler. British 332,432.

Mixers. A. B. Smith and C. R. Smith. French 691,275.

Mixer for concrete and the like. Lionel James Baker Blake. German 504,857.

Screening and Separating

Separation of dry materials. C. W. H. Holmes, I. L. Bramwell and the Birtley Iron Co., Ltd. British 332,-291.

Separation of dry material. B. L. Bourke and the Birtley Iron Co., Ltd. British 332,583.

Apparatus for washing, separating or concentrating minerals or other granular materials. British 332,682.

Magnetic separator. A. Gouin. French 691,038.

Process and apparatus for separation and recovery of particles in suspension in water. C. B. Thorne. French 691,212 and 691,213.

Air separator. E. Barthelmess. French 691,276.

Separation of materials of different densities by means of liquids. C. W. H. Holmes and The Birtley Iron Co., Ltd. French 691,309.

Dust separator. Allgemeine Elektrizitaets-Gesellschaft. German 504,-751.

Miscellaneous

Concrete railway ties. W. C. Yeomans. British 332,659.

Concrete floors, and blocks or slabs therefor. L. E. Callebaut. British 332,805.

Portable apparatus for sand-blasting surfaces of ships, bridges, buildings and the like. B. M. Bailey. British 332,849.

Construction elements of artificial stone and the like. P. Lafon. British 330,933.

Process and apparatus for extracting salt from saline lakes. Bozel-Maletra, Societe Industrielle de Produits Chimiques. French 689,425.

Process and apparatus for geophysical prospecting of underground deposits. Mines Domaniales de Potasse d'Alsace. French (addition) 37073/ 685,487.

Press for making building stones and the like from cement mortars, etc. Carl Feldmann and Hinrich Feldmann. German 502,404.

Process for production of hydraulic cementing material. "Kolloidchemie" Studiengesellschaft. German 502,894.

BUILDING MATERIAL PRICES, JULY 1, 1930.

Data collected by the Bureau of the Census and prepared by the Division of Building and Housing, U. S. Bureau of Standards.

CITY	Portland Cement	Gypsum Plaster	Gypsum Plaster Board	Lime	Building Sand	Crushed Stone	Roofing Slate
Unit	bbl.	ton	1,000sq.ft.	ton	cu. yd.	ton	100 sq. ft.
Akron, O	$2.67		$36.00	$18.00	$1.85		
Albany, N. Y	2.97	$17.10	24.75	18.00			
Atlanta, Ga	3.25	20.00		21.00	2.50	$3.25	
Baltimore, Md	2.40	14.50		13.50	2.25	2.75	$10.00
Birmingham, Ala	3.00	17.00		20.00	3.00	2.50	
Buffalo, N. Y	3.10	14.00	25.00	18.00	1.85	2.05	12.00
Chicago, Ill	2.20	15.00	21.00	17.00	1.50	1.90	
Cincinnati, O	2.94		24.75	16.40	2.63	2.55	
Cleveland, O	2.80	15.50		16.00	1.95	2.70	16.00
Columbia, S. C	2.90	17.00		18.00	1.25	2.50	
Columbus, O	2.75	15.00	23.00	17.50	2.25	2.50	11.00
Des Moines, Ia	2.66	10.00	23.75	20.00	1.60	3.60	13.00
Erie, N. Y	2.40	16.00	22.50	19.00	2.25		
Fairmont, W. Va	2.80	18.00	35.00	16.00	3.15	3.50	13.00
Haverhill, Mass	2.80	18.50	25.00	20.00		3.20	
Kansas City, Mo	2.50	15.00	25.00	19.00	2.70	2.25	13.13
Lansing, Mich	2.75	16.00		20.00	2.25	2.25	
Long Beach, Cal	1.76	17.50	34.00	26.00	1.95	2.20	
Los Angeles, Cal	1.72	17.50	34.00	24.00	1.00	1.30	
Louisville, Ky	2.52	16.00		15.50		2.43	
Milwaukee, Wis	2.60	18.00	25.00	16.00	1.75	1.75	14.00
New Bedford, Mass	2.60	17.50	25.00	18.50	1.75	3.00	
New Haven, Conn	2.90			25.00	1.50	2.25	
New London, Conn	2.80	18.00	25.00	26.00	1.50	3.00	
New Orleans, La	2.65	20.00		16.00	2.75	3.00	10.50
Paterson, N. J	2.60	16.00	25.00	18.00	1.50	2.10	14.00
Philadelphia, Pa	2.30	19.75		15.50	1.85	2.65	11.00
Poughkeepsie, N. Y	2.04				2.25	2.20	
Richmond, Va	3.10	20.00	31.00	17.50	1.95	2.45	13.00
Rochester, N. Y	3.25	17.00	22.00	22.00	2.00	2.40	12.00
St. Louis, Mo	2.45	18.00		18.00	2.23	1.75	13.00
St. Paul, Minn	2.75	16.00	21.00	21.00	1.40	2.00	13.00
Saginaw, Mich	2.40	17.00	25.00	18.00	2.50	3.25	17.00
San Antonio, Tex	2.60	18.15	37.00	20.00	2.10	2.35	
San Francisco, Cal	2.42	16.90		20.00	1.40	1.60	16.00
Savannah, Ga	2.25	16.00	25.00	20.00	1.75	5.50	
Scranton, Pa	2.80	19.00		20.00	3.25		
Seattle, Wash	1.90	20.00	35.00	22.00	1.25		
Shreveport, La	3.60	22.00	39.00		2.00	4.75	15.00
Sioux Falls, Ia	3.00	15.00		24.00	1.25	2.25	
Syracuse, N. Y	3.00	17.00	22.50	18.00	2.00	2.25	
Tampa, Fla	2.40	18.00		18.00	2.00	4.25	
Terre Haute, Ind	2.85	20.00	28.00	18.00	1.65	3.50	14.50
Toledo, O	2.25	14.00	22.50	12.00	2.00	2.50	
Trenton, N. J	2.40	17.50	26.00	18.00	1.50	2.10	14.00
Tucson, Ariz	3.17	17.10		30.00	1.25	2.25	
Washington, D. C	2.65	17.00	25.00	14.00			
Waterbury, Conn	3.00	20.00	30.00	20.00	1.35	2.45	15.00
Winston-Salem, N. C	2.80	17.00	23.50	14.00	1.50	3.50	
Youngstown, O	2.95	15.00	40.00	18.00	3.71	2.75	15.50

Legal Information for Operators

State Retains Title to Gravel in Large Streams

It is important to know that the law is well established that the owner of land adjoining a navigable stream, deriving title from the United States, takes only to the high-water mark, the title to the bed of the stream being in the state. However, the owner upon a non-navigable stream is entitled to the center of it. Therefore, a person or firm who mines sand or gravel from a sand-bar in a navigable stream is not obligated to pay the owner of the abutting land for the material thus taken.

Sometimes considerable difficulty is presented in determining whether a stream is navigable. While the Courts take judicial notice of the navigable character of our important rivers and inland lakes—those that are so within our common knowledge—there are many streams of such insignificant capacity and doubtful utility that the question is to be determined by the evidence produced and, in such case, the burden of proof rests upon him who asserts that the stream is navigable.

For instance, in Lutesville Sand & Gravel Co. v. McLaughlin, 26 S. W. (2d) 892, it was shown that a property owner held a deed in title as "all that part lying on the left or east bank of Spring River." A sand-bar formed in the river abutting the property and a gravel company extracted large quantities of gravel therefrom. The owner of the land sued the gravel company for the value of the gravel on the contention that the stream was non-navigable. This property owner testified that the river was navigable, even for steamboats, at certain seasons of the year, but that this navigable condition was intermittent and irregular, and that, in low water, the river was not navigable for rafts, and that there were certain fords which could be crossed in low water, by automobiles.

It is interesting to observe that the higher Court held the river to be navigable, saying: "It is not necessary that the stream should be capable of floating boats or rafts the whole, or even the greater part, of the year. Upon the other hand, it is not sufficient to impress navigable character, that there may be extraordinary times of transient freshets, when boats might be floated out. For, if this were so, almost all insignificant streams would be navigable. The true criterion is the dictate of sound, business, common sense, and depends on the usefulness of the stream to the population of its banks, as a means of carrying off the products of their fields and forests, or bringing to them articles of merchandise. If, in its natural state, without artificial improvements, it may be prudently relied upon and used for that purpose at some seasons of the year, recurring with tolerable regularity, then, in the American sense, it is navigable, although the annual time may not be very long. Products may be ready and boats prepared, and it may thus become a very great convenience and materially promote the comfort, and advance the prosperity of the community. But it is evident that sudden freshets at uncertain times cannot be made available for such purposes. . . . We conclude, therefore, that Spring River is a navigable stream and, being such, that the plaintiff (property owner) had no cause of action to recover the value of the gravel taken from the stream opposite her land."

Refuse Gravel Shoveler Reparation for Injury

Generally speaking, an employer is liable in damages for injury to an employee only when the testimony indicates that the employer's negligence in failing to supply a safe working place or safe appliances resulted in the injury. Moreover, the employer is not liable if the danger of the employment was apparent to the employee.

For example, in Cary v. Streeter & Sons Co., 169 N. E. 782, it was disclosed that an employee was supplied with a shovel with which to shovel gravel that was being unloaded from motor-trucks and dumped into an excavation.

One day, as the truck was being unloaded, the employee slipped, dropped the shovel and fell, sustaining severe injuries by the truck. He sued the owner of the truck for damages, contending that the latter was negligent in not supplying a platform upon which to stand when shoveling the gravel as it was being unloaded.

However, it is interesting to observe that the higher Court held the employee not entitled to damages, and said:

"There was no evidence that the truck was defective or unsuitable for the purpose for which it was used or that it was operated negligently. The swinging of the tail-board was an ordinary incident of unloading. Nor could it have been found that the defendant (truck owner) was negligent in failing to furnish planks or loading platforms . . . It does not appear that it was not reasonably safe to shovel the material dumped from the trucks without the use of planks or loading platforms . . . The plaintiff was an experienced shoveler. It does not appear that the dangers of the place in which he was set to work or the nature of the material in the load in question was not open and obvious to his inspection."

Court Opinions Varied on Explosion Liability

In view of the numerous higher Court cases, the law is well established that the owner of explosives is liable in damages for injuries effected by carelessness on the part of the latter, or his employees, in storing the material, or in leaving it in such places as may ordinarily be frequented by persons unaware of the danger. On the other hand, the owner of explosives is not legally bound to anticipate unusual circumstances under which trespassers may sustain injuries.

For illustration, in the case of Kennedy v. Independent Quarry Co., 291 S. W. 475, it was disclosed that two boys, while visiting a quarry for a swim in a pool, entered a shed to remove their clothing and found a tin box containing explosive caps and a fuse. The boys took the box and caps home intending to explode them for the fun.

Later, when the boys were in the act of lighting the fuse, another boy named Kennedy came up to learn what was being done. At this instant, one of the caps exploded, blinding Kennedy.

The parents of Kennedy sued the owner of the quarry for damages, contending that the latter was negligent in leaving the explosives in an unlocked shed in which boys were accustomed to go to remove their clothing previous to entering the pool in which various boys were known by the owner to swim regularly.

However, since Kennedy did not obtain the caps from the quarry premises, the Court held the owner of the quarry not liable, and quoted:

"It may be stated as a general principle of the law that one who has in his possession or under his control an instrumentality dangerous in character is bound to take exceptional precautions to prevent an injury being done thereby. . . A child of tender years, and youthful persons generally, are entitled to a degree of care proportioned to their ability to foresee and avoid the perils they may meet."

However, in numerous other cases, where children have been injured by explosives negligently left lying in an insecure place, the owners of the explosives have been held liable for the resultant damages.

For instance, in the case of Green Co. v. Diehl, 299 Mo. 641, a boy seven years of age found explosive caps and was injured by an explosion. The owner of the quarry knew that children were accustomed to pass along that way, and his negligence in leaving dangerous explosives lying around resulted in his liability.

Insurance Problems Discussed

How to Liquidate the Assets of a Partnership

It is important for members of a partnership and officials of closed corporations to appreciate the need for a plan to continue the business after the death of one partner. It is also important to know how much life insurance is needed to carry through such a plan. But most important of all is to know how to write the policies correctly.

Naming the right person as beneficiary is the heart of business life insurance. If a mistake is made on this point, the purpose of the insurance may be defeated.

Of course, where life insurance has been purchased merely to indemnify a firm for the loss of services of a key man, there is no complication because the policies should be made payable directly to the firm or corporation. Similiarly, where insurance has been taken out for the purpose of guaranteeing or stabilizing a firm's credit following the premature death of a key man, the firm should properly be named as the beneficiary.

Proceeds to Partner

When insurance is used to buy out the interest of a deceased partner and to turn the business over to the survivor without interruption or loss to anyone, we must stop to analyze all the steps involved in such a deal. Of course, the ultimate beneficiary is the widow of the deceased partner. The idea is that, thanks to the life insurance, she is to get cash equal to her husband's share in the firm. This cash she is expected to invest in an annuity or conservative bonds so that her income will be free from speculative risks. At the same time, full control of the business is turned over to the surviving partner. But, although the widow is the one who finally uses the insurance proceeds, it is usually not advisable to have her name on the policies. The official beneficiary may be (a) the insured's wife (or estate), (b) the firm, (c) the other partner, or (d) a trust company. In the majority of cases, the other partner is the proper beneficiary to be declared in the policies, and the following paragraph will outline the principal circumstances which determine the right choice.

Who Owns Policy?

The basic trouble with naming the wife or other relative of the insured partner as beneficiary lies in the fact that all ordinary life insurance policies accumulate a cash or loan value. The cash value belongs to whoever controls the policy. When a man buys personal insurance for his own family, he normally retains for himself the right to change the beneficiary, because he can foresee that the death of his wife or the birth of children might alter his needs. Wherever the insured has the unlimited right to change the beneficiary, the entire cash and loan value belongs to him exclusively. Therefore, if a partnership deal were made up with each man's insurance payable to his own wife and no "string" were placed on the cash value, any partner could terminate the arrangement, if he wished to, by just cashing in on his policy. It is legally possible to name the insured's wife as beneficiary irrevocably, but such a plan brings up the objection that, if the wife should be divorced or become insane, the situation would be sadly messed up. It would be very direct and convenient to have the insured's wife as beneficiary, thus making the transfer of interest to the survivor automatically and guaranteeing the business against interruption, but a scheme of this kind contains lots of room for law suits.

Firm Not Interested

We should point out, furthermore, that the firm itself is not a logical beneficiary. The contract to sell out on death in exchange for insurance proceeds is a personal agreement between the partners as individuals. It is the surviving partner, not the firm, who is proposing to buy out the decedent's interest.

The surviving partner is the right beneficiary. He collects the insurance money, takes it to the decedent's executor and exchanges it for a regular bill of sale, making his ownership of the business absolute. The policy, of course, should stipulate that the insured cannot change the beneficiary because, otherwise, an unscrupulous partner could easily destroy the plan at any time. The cash and loan values and other collateral rights should not belong to either partner alone but to both jointly, because both are equally interested in the maintenance of the plan. As the death of the beneficiary gives his rights to the insured in the standard life-insurance policy, the insurance must be amended so that the death of the beneficiary would transfer his rights to his own estate. This is necessary to care for the possibility that the survivor might die before the final exchange of the formalities has been completed.

Using a Trustee

Insurance agents are more and more advising their clients to retain a bank or trust company as a neutral stakeholder for the transfer of shares in a business for, in this situation, the proceeds can be made payable directly to the trust company as trustee. The trustee should be named without the right to change the beneficiary, and the trust agreement should be referred to in the policy. Whenever the possibility of business insurance is brought up between two partners, there is a heated discussion as to whether the partners' own lawyer should handle the execution of the plan at death or whether it should be put in the hands of a trustee. The objections to a trust company are that it is a stranger and it charges a fee for its services. While we cannot give a blanket recommendation which will fit all cases, we can point out the factors involved so that you can get a clear answer for yourself. In the first place the banks in many small communities have no trust department that is competent for these purposes. It is better not to have a trustee than to use a bank which has no one with special training and practical experience in the legal intricacies of this particular field. If you have access to a high-class trust department, you can make your agreement much safer by using it. The objection that the bank charges a fee fades when you realize that the bank's fee will probably be no more than the personal attorneys of the partners would charge just for supervising the transaction. The trust company offers expert knowledge and impartial justice between the surviving partner and the widow, with the result that there is very little chance of controversies and law suits.

If Both Die

One unusual possibility which should be covered in any partnership agreement is the chance that both partners might die at about the same time. Both might be killed together in an accident, or the death of the survivor might occur before he has completed the purchase of the first decedent's interest. If there is no sound proof as to which died first, the complications might be insurmountable. But, in any case, if both partners are dead, the whole deal is not needed. The purpose of the contract is to guarantee the continuation of a business but, if there is no survivor left who can guide the firm advantageously, it might as well be liquidated. It would seem advisable to put an extra provision in every partnership contract stating that, if both partners die simultaneously or before the transfer of interest has been completed the agreement for purchase is void and the insurance proceeds may be retained by the respective beneficiaries.

Limestone Dust Found Less Harmful to Worker

Limestone quarry workers suffer less from the effect of dust in the Bedford and Bloomington, Ind., districts than any other group in the industry, according to research reports. This situation is attributed to the fact that Indiana limestone contains less silica than other stone.

New Machinery and Supplies

Traction Well Drill of All-Steel Construction

A new well drill with cushion shock absorbers has just been placed on the market by the Keystone Driller Co., Beaver Falls, Pa. The drill, known as the No. 1½ Traction well drill, is a gas-driven, clutch-hoist machine with a capacity rating of 300 ft. to 600 ft. and a road speed of eight miles per hour. It weighs only 5 tons.

The drill is of all-steel construction. Only the walking beams and derrick are of wood. This provides the maximum of strength and durability, at the same time reducing the weight of the machine to 11,000 lb.

All the good features of the Keystone spudding device, leader for 40 years in its field, have been retained but with increased efficiency. All shafts are set down on the main sills, eliminating weight and cost and lowering the center of gravity. The machine is low and stable, fore-and-aft and sidewise.

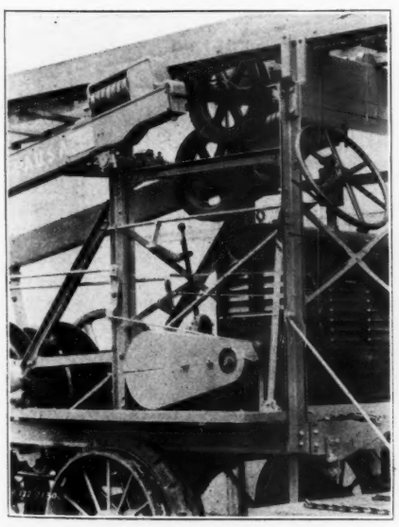
The drilling stroke is longer—32 in. on the rope over the hole. Speed of stroke is 50 to 60 per min., insuring maximum drilling speed.

The engine is a 20-hp. cross-mounted unit, and has a Cotta transmission with three speeds forward and one reverse. This gives the flexibility and variability of speed and power that drillers all desire. It will pull ordinary tools on high gear.

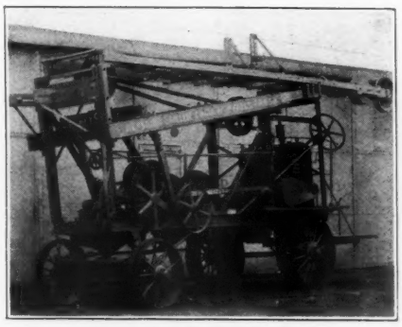
Ten years ago the driller moved over dirt roads from one job to another, and his machine was equipped with cleated iron tires to meet that condition. Today he moves largely over cement and macadam pavement. In some localities the iron-cleated tire is forbidden on the paved highways.

Today the driller desires to move farther and faster than he did ten years ago. Instead of a district ten or fifteen miles square, he now desires to work over an area 50 miles in diameter, and he must move over the paved highways, because most main arteries are now paved.

The No. 1½ is equipped with rubber tires of ample width and thickness, and the machine has a traction speed of eight miles per hour. A jump of 25 miles, from one job to another, can be made in half a day.



Dual shock absorbers on drill.



Blast-hole drill with all-steel frame.

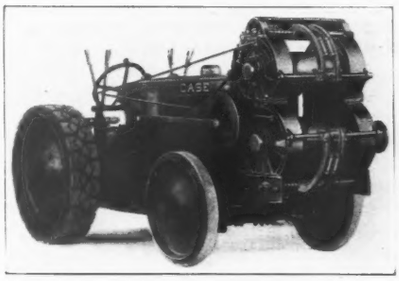
New Tractor Hoist Has Convertible Features

The Trackson Co., Milwaukee, Wis., has brought out a new model of portable hoist known as the Model HC, which is adapted to mounting on the Case Model CI (industrial) and Model C (agricultural) tractors.

This combination provides an unusually efficient and sturdy hoisting unit for contractors, builders, industrial plants, etc. The Case tractor is well known for its economical and dependable power and the Trackson hoist has established a wide reputation for remarkable performance. Together they make a unit that is especially suited to such jobs as handling concrete and other building materials, steel erection, double elevator operation, lifting heavy machinery, dragline excavating, and other similar work.

The Model HC Trackson hoist has many improvements and additions which make for greater efficiency and economy. Some of these are as follows: over-sized drum shafts, stronger frames, improved clutches, and the Trackson level wind which prevents the cable from criss-crossing and bunching up. Every detail of the construction of this hoist has been planned with the users' requirements in mind. Operation is extremely simple and all of the controls are within easy reach of the operator. All moving parts are shielded in order to minimize liability of accidents. Like other models of the Trackson hoist, Model HC can be obtained either as a single- or double-drum unit and either can readily be converted into the other type by merely mounting or detaching the upper drum. Owners of the single drum units can easily add the upper drums and thus convert their hoists for all work where a haul-back line is necessary.

The patented level wind, which is an exclusive Trackson feature, greatly reduces wear and tear on the cable because it eliminates bunching up, kinking, and tangling as the cable is wrapped on the drum. It winds evenly and smoothly, layer after layer, at all speeds, and handles different sizes of cable. Working with this device is an anti-back-lash which maintains proper tension and keeps the cable securely wrapped, even when the line ahead suddenly goes slack.



Tractor-mounted hoist.

Manometer Is Easy to Read at Distant Points

A new line of manometers and flow meters designed to permit easy reading at a distance, has been placed on the market by the Meriam Co., Cleveland, Ohio.

The scale is boldly-marked, the special liquid used stands out with exceptionel clearness, and the tube itself is almost twice the diameter of the usual type of instrument. The instrument may therefore be placed overhead or at a distance from the observer without hindering the quick reading of pressure or flow of the air, gas, steam or liquid measured.

Appropriately enough, the first set of these "high visibility" manometers was supplied to the order of the United States Navy Yard at Charleston, to meet the exacting conditions of the fire-room of the U.S.S. *Dupont.*

Since the correct operation of the instruments is in no way affected by the internal diameter of the U-tube the large tube-size used in no way affects their basic accuracy, and there are no mechanical parts to wear or require adjustment.

Small Electric Shovel Has Four-Wheel Drive

The Terminal Engineering Co., New York, has added-to its line of material-handling equipment, an electric four-wheel-drive shovel truck of entirely new type, for handling bulk materials. The machine is small enough to work inside a box car, and yet dig and carry one-ton loads. The shovel is capable of unloading a box car every hour, carrying its loads almost any desired place, either indoors or outdoors. Ruggedness is an important feature of these machines because they must be able to run into piles of crushed stone, lift out a bucketful and then carry the load over rough ground to the dumping place. Because of their four-wheel drive with separate motor for each wheel, these machines have the necessary traction for pushing their shovels into a pile, and for work in slippery places, on cinder fill yards, sand or snow. Their traveling speed is faster than is usual on industrial trucks, being 10 m.p.h. empty and 8 m.p.h. loaded.

As the loads are all carried in an overhung position, a maximum counterbalance is obtained by locating the battery, hoist, etc., as far away from the load as possible at the opposite end of the frame. Heavy loads carried on any overhung type truck tend to transfer the weight to the wheels near the load, and thus leave the wheels farther from the load (which are usually the driving wheels) with very little load on them. The result is a loss of traction which is not encountered when all four wheels are driven. With the TEC four-wheel drive, the heavier the load the greater the traction.

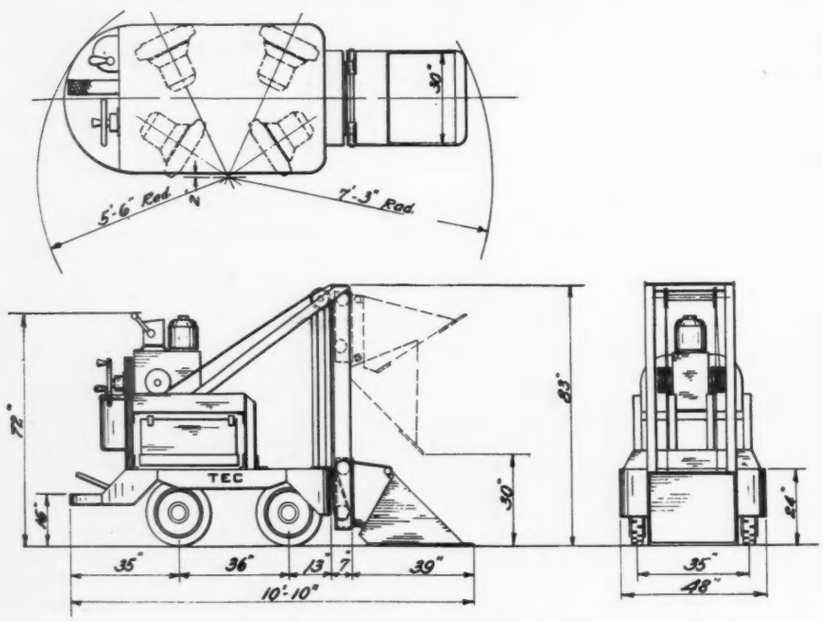
In designing this new shovel truck, the manufacturers have had an eye on the standardization of parts. If desired, the elevating structure can be replaced in a very short time with a crane boom. All the main functioning units, such as wheels, battery, motors, steering, braking, hoisting, etc., are interchangeable with those of all models of TEC equipment.

Four-wheel drive shovel truck.

The shovel buckets are made in various widths for handling materials of different specific gravities. A single hoist unit controls all the functions of the bucket. An automatic stop on the upstroke speeds up the operations on short haul work and acts as a safeguard.

The uprights, on which the shovel carriage runs, may be built to any desired height. A favorite height, shown in the illustration, is one which will work in box cars. The turning radius is exceptionally short because all four wheels steer. The truck turns about a point only two inches from the side of the truck, midway between the axles, and is able to do this short turning because each wheel is driven by a separate motor.

The shovel is operated from a storage battery which is in a steel compartment, placed over the wheels at the driver's end, to act as a counterbalance. As with all equipment made by the Terminal Engineering Co., this shovel truck is designed for quickly and easily interchanging batteries for continuous operation, 24 hours per day if desired.



Sketch of the truck-mounted ¼-cu. yd. shovel.

Many safety features are built into these shovel trucks. There are two sets of brakes — (1) mechanical on two wheels, and (2) electrical on four wheels —operating independently from the foot pedal and speed controller respectively. The operator's hands are always protected from injury because all controls are within the outer edges of the truck at all times, the steering being done by a wheel rather than handlebar.

New Oxygen Regulator Free From Fluctuation

A constant line pressure, free from any fluctuation, is most desirable for good results in oxwelding. The Oxweld Type R-43 oxygen-welding regulator, recently introduced by Oxweld Acetylene Co., New York, N. Y., guarantees a freedom from fluctuation by means of a system of two-stage pressure reduction. This reduction is accomplished through two separate and independent

Oxygen welding regulator.

sets of diaphragms, valves and springs. The full cylinder pressure of 2,000 lb. enters the regulator through a stem-type valve and is controlled by the first stage diaphragm. In this stage the pressure is reduced to less than 250 lb. per sq. in. This pressure will be constant for any one regulator, but varies somewhat with different regulators. The pressure here is non-adjustable.

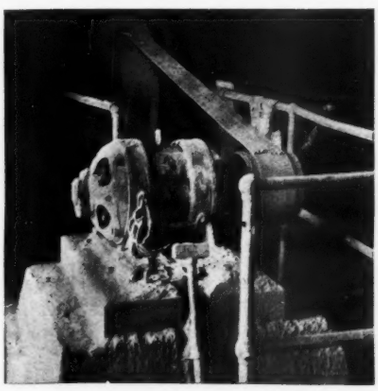
The oxygen then passes from this first reduction assembly to a second stem-type valve and diaphragm assembly where the pressure is reduced to the working pressure desired by the operator. This pressure is regulated by the operator by means of the adjusting screw, and any operating pressure may be obtained without fluctuation.

The external appearance of the regulator should be noted. Instead of the usual handle-type pressure adjusting screw found on all other Oxweld regulators, there has been substituted a screw with a ribbed cap. This radical change in external design not only presents a neater and more compact appearance but will also avoid the possibility of breakage as there are no projections on the handle to be bent accidentally.

Sealed-Sleeve Bearing for Industrial Motors

A housing, in which effective measures have been taken to prevent oil leakage and exclude dirt, is shown in the accompanying cross section. The rather novel methods of effecting these results have earned for it the name of sealed-sleeve bearing, now widely and favorably known throughout the United States and Canada. It is being manufactured by Westinghouse.

In addition to providing an adequate support for the bearing, as at *P*, it embodies features which are effective in accomplishing what has seemed so difficult in the past—the complete exclusion of dirt and the retention of all

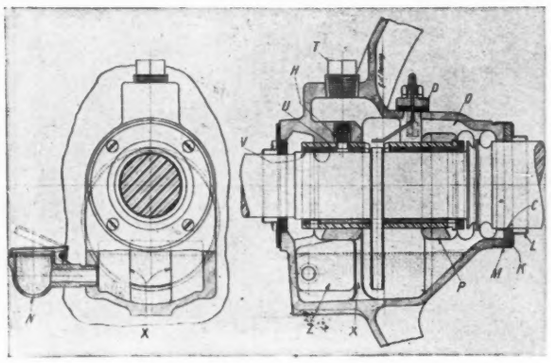


Cement-plant motor with sealed-sleeve bearings.

the oil within the housing. Of special importance in this connection is the washer of soft resilient felt *K* closely girthing the shaft at *C* and held in place by the pressed steel bearing cap *M*. This cap has an over-hanging lip portion *L* with a small running clearance on the shaft at the outer end. These parts have proved highly efficient in excluding dirt and retaining oil. Parts *T* and *D* tightly and rigidly close the inspection hole and the slot for inserting the oil ring respectively. Cored channel *O* balances the air pressure between chambers of the housing. Pressure relief groove *U* in the bearing prevents squirting of oil under high pressure through the space between bearing bore and shaft as at *V*. The dowel screw *H* does not extend through to exterior of the housing so that oil leakage cannot occur at this point. The threaded engagement of overflow gauge *N* with the housing is sealed by oil-proof cement. This gauge, it will be noted, communicates with the oil reservoir in a quiet oil chamber *Z* partially separated from the main chamber by partitions *X*. The partial isolation of this chamber also permits settling of any sediment present, thus preventing it from circulating through the bearing.

These and other features of the design are by no means spectacular, but, working together, they are practical, effective, and individually essential. They provide barriers against leakage through capillarity, leakage through windage suction, and leakage through excessive and careless oiling as well as against entrance of dirt into the housing.

Thus protected, the bearing may, without interference and without danger of damage to adjacent parts, perform its important functions with minimum friction loss. In these days when many have fallen into the careless habit of referring to plain bearings as "friction" bearings, it may be surprising, but it is true, that the bearing illustrated will with very little attention eliminate 99 per cent of the possible loss due to metal-to-metal friction when carrying the rotor of an ordinary industrial motor. Furthermore, it is true that, under normal conditions, metal-to-metal friction is entirely eliminated, that vestige of friction remaining being due solely to the movement of the oil molecules among themselves, and in no wise detrimental to the bearing and journal surfaces. The oil film separates these surfaces. The journal actually floats on the film.

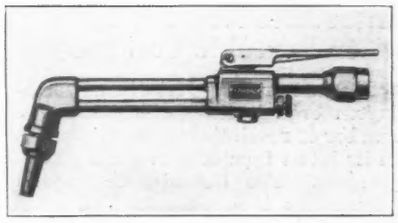


Cross-section, sealed-sleeve bearing.

Offers New Attachment for Welding Blowpipes

Oxweld Acetylene Co., New York, N. Y., has recently introduced new accessories for the Type W-17 welding blowpipe introduced last winter, which now make this blowpipe capable of doing almost any type of work which may be required of an oxy-acetylene blowpipe.

The Type CW-17 cutting attachment enables the blowpipe to do a reasonably wide range of cutting work. This cutting attachment differs radically from any such attachment which has previously been manufactured. It will be noted that a long handle is used for operating the cutting oxygen valve. When this handle is not in use, it can be pulled forward parallel to the tubes so that the whole attachment may be carried around in the operator's pocket. The attachment has the same style stem lock nut as the welding head for the Type W-17 blowpipe. The injector for the heating flames is contained in the attachment, just as the injectors are contained in the welding heads. At



Cutting attachment in operating position.

the rear of the attachment near the bottom is an adjusting screw, so that the oxygen for the heating flames may be regulated by the operator's thumb and forefinger while the blowpipe is in operation. The attachment is joined to the blowpipe handle in exactly the same manner as a welding head, that is, the lock nut can be tightened by hand and no wrench is necessary to join the attachment to the handle. The attachment is supplied with two cutting nozzles.

Another accessory which has just been introduced for use with the W-17 welding blowpipe is the W-17 to W-15 adapter which makes it possible to use any of the welding heads available for the Oxweld W-15 sheet-metal welding blowpipe with the Type W-17 welding blowpipe handle. This means that the W-17 welding blowpipe may be used on work ranging from the lightest type of welding to the heavy general welding work required of such equipment. The end of the adaptor which fits onto the W-17 blowpipe handle is similar to the rear end of a W-17 welding head. The adaptor contains passages for the oxygen and acetylene which fit tightly against the passages in the blowpipe handle. The other end of the adaptor is exactly the same as the end of a W-15 sheet-metal blowpipe handle, so that no more adjustment is required in attaching the W-15 welding head to the adaptor than to a W-15 handle.

Bronze Valves Featured by Slip-On Disk Holder

Bronze valves with the one-piece screw-over bonnet and slip-on stay-on disk holder have just been announced by Jenkins Bros., 80 White street, New York, N. Y.

The valves are made in globe, angle, across and check types for all standard services.

The one-piece screw-over bonnet in combination with the slip-on stay-on disk holder is an entirely new departure in bronze valve design. The one-piece bonnet construction provides ease in removal, and contributes unusual strength, which, it is claimed by the manufacturer, prevents springing or distortion, even though the bonnet is removed and replaced repeatedly. The valve throughout is heavily proportioned.

The slip-on disk holder facilitates changing the disk. If the spindle is raised just a turn or so, the bonnet can be removed from the valve body without danger of the disk holder slipping.

Introduce New Features in Portable Compressor

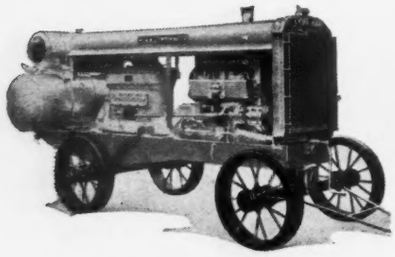
The fast-growing Metalweld-Worthington organization is introducing a number of revolutionary developments in its latest type of portable air compressors. The H-Model Continental engine has been adopted and, since May 1, is being used as the power unit for all compressors of 220, 280 and 330-cu. ft. displacement.

The oil circulation in this engine represents one of the greatest advances in gas-engine design in recent years, and was developed with the purpose of reducing operating temperatures, which is a vital factor in air-compressor use. Actual tests have shown reductions in temperature of circulating oil as great as 35 deg. F.

The dry-slump system is used in this engine; in other words, the old method of crankcase oil pan accumulation has been replaced by mounting a special aluminum oil reservoir high on the side of the engine block. This reservoir is provided with a series of cooling fins and is located directly in the cool air path from the fan. A liberal air space also is allowed between the reservoir and the engine.

A separate low-pressure pump takes the oil, as rapidly as it collects in the bottom of the pan, and forces it up to the reservoir where it first passes through a metallic disk filter set in a separate built-in, open-top filter compartment of the reservoir. In this filter the oil is forced between the core of a series of centerless disks which alternate with a series of copper wiper plates. The foreign matter in the oil lodges between these disks and can be removed daily by turning a handle located at the outside of the reservoir which rotates the metal disks against the stationary wiper plates. The dirt collects in the cleaner compartment and may be drained off separately without disturbing the clean lubricating oil. The cleaned oil overflows from the cleaner compartment into the reservoir proper, whence it flows by gravity to the high pressure oil pump for re-circulation to main bearings and all bearing surfaces.

Another desirable feature of the H-Model engine is the removable cylinder sleeves. This principle has already proved its practical value in quality engines where long life is offered. These sleeves can be replaced by any good mechanic at a minimum of cost and eliminate all the trouble of ordering oversize parts as well as the prohibitive cost of reboring cylinders.



Portable air compressor.

Sheave Diameter of But Six Inches on New Block

Recent development of a Sauerman "durolite" steel dragline block with only 6-in. sheave diameter makes these blocks now available in a wide range of sizes from 6 to 42 in. They were first put on the market about four years ago in standard sizes of 12 to 30 in., and blocks within this range of sizes still serve the requirements of most slackline cableway and power scraper installations. Development of larger coal-storage and earth-moving power scraper machines, however, has caused the addition of blocks of 36-in. and 42-in. diameter to the standard sizes, and at the other end of the line small "durolites" with 10-in., 8-in. and 6-in. sheaves excavating where absolute minimum weight is the prime requirement.

Block opens to receive cable by releasing only one pin.

Block with swivel hook attachment.

The blocks are built of light and tough special heat-treated alloy steels combining great strength with light weight. The flange of the sheave is protected by a heavy bead on the housing, eliminating any possibility of fouling and protecting the cable. The block can be opened up to receive or to remove cable by simply removing one pin from the yoke; it can be completely taken apart with a small wrench, and can be kept in repair indefinitely. Lubrication is provided through the sheave, and not through a center-bored axle, and a grease reservoir is provided around the bearing.

Use Tractor Power for New 3/8-Cu. Yd. Shovel

A one-man tractor shovel, designed for high-speed operation and powered by an Allis-Chalmers Model U tractor, has been developed by Bay City Shovels, Inc., Bay City, Mich.

This shovel is recommended by the manufacturer for jobs which do not require heavy machines. One of its features is economy of operation, made possible by its comparatively light weight and its compact design. Another factor which aids low-cost operation is the fact that a ¾ swing enables this machine to maintain part revolving economy.

This unit is mounted on long, full crawlers which carry a pressure of only six pounds per square inch of ground surface. Working weight is ten tons. Construction is all-steel throughout, gears are machine cut and shafting of special analysis. Timken and Hyatt roller bearings are used. The shovel has ⅜-cu. yd. capacity.

The machine is quickly convertible from shovel to clamshell, dragline, trench hoe or skimmer, one man operating in each case. It has three propelling speeds up to four miles an hour, permitting the machine to be moved as desired.

The shovel is said to be the heaviest and largest in which tractor power is used. It is not an attachment for the tractor, the Allis-Chalmers power plant being installed as a permanent unit. It is sold and serviced by most Allis-Chalmers tractor dealers.

One-man tractor shovel in operation.

Manufacturers' Publications

Each publication listed below contains information of interest to nonmetallic mineral producers. Readers may obtain, without charge—except where a price may be stated—and without obligation, copies of any of these publications by writing directly to the manufacturers who publish them. Please mention PIT AND QUARRY *when writing.*

Abrasives

"New 1930 Safety Code on the Use, Care, and Protection of Abrasive Wheels." 2 p. *(Grits and Grinds* for August, 1930. Norton Co., Worcester, Mass.) Describes revisions in the code which is now ready for distribution by the Grinding Wheel Mfg. Assn.

Alloy Steel

What is Manganese Steel? 4 p., 38 ill. (American Manganese Steel Co., Chicago Heights, Ill.) Describes the manufacture of manganese steel and illustrates its use in a wide variety of pit and quarry equipment.

Bending Machines

Hand and Power Bending Machines. 32 p., 68 ill. (Bulletin No. 26. Wallace Supplies Mfg. Co., Chicago, Ill.) Describes and illustrates machines for bending metals into any conceivable shape for ready adaptation in plant repairs and maintenance.

Concrete Machinery

Besser Batch Mixers. 8 p., 20 ill. (Besser Mfg. Co., Alpena, Mich.) Describes and illustrates batch mixers for concrete plants in all standard capacities of 5 to 50 cu. ft. and lists specifications.

Drills

Light All-Steel Spudders by Keystone. Broadside mailing piece, 4 ill. (Keystone Driller Co., Beaver Falls, Pa.) Describes and illustrates a new well drill containing important new features.

Dryers

The Drying of Fine Materials. 32 p., 18 ill. (Colorado Iron Works Co., Denver, Colo.) Describes and illustrates the Lowden dryer designed primarily for extremely fine materials which form a sticky mass when wet and which have a tendency to dusting when dry.

The Dryer with All of the Vital Points. 4 p., 2 ill. (Hardinge Co., York, Pa.) Describes and illustrates the Ruggles-Coles dryer and suggests applications of the machine in the pit and quarry field.

Dust Collectors

Clark's Patented Skimmer Collector. 1 p., 1 ill. (Clark Dust Collecting Co., Inc., Chicago, Ill.) Describes and illustrates the actions of a collector especially designed for the recovery of fine dust. Bulletin No. 70 of this company gives additional information.

Feeders

S-A Manganese Steel Feeders. 4 p., 9 ill. (Stephens-Adamson Mfg. Co., Aurora, Ill.) Describes and illustrates a new feeder designed primarily to handle abrasive bulk materials in large tonnages and the folder contains installation photographs, tables of capacities, dimensions and building clearances. Diagrams are also given to show the construction of the patented Amsco manganese steel pans that interlock to form a rigid conveyor surface upon which carloads of material may be dumped.

Fire Prevention

Saveall Fire Control Systems. 4 p., 2 ill. (Globe Automatic Sprinkler Co., Philadelphia, Pa.) Describes and illustrates the installation of automatic fire control systems and points out particular hazards where they should be used.

Grinding

Closed Circuit Grinding for Cement Industry. 4 p., 3 ill. (Hardinge Co., York, Pa.) Describes and illustrates the use of primary and regrinding conical ball mills in an Arizona plant.

Pulleys

V-Belt Sheaves. 16 p., 6 ill. (Catalogue No. 34. Pyott Foundry Co., Chicago, Ill.) Describes and illustrates the use and application of V-belt pulleys and sheaves to a wide variety of plant and machine-shop installations.

Shovels, Convertible

Bay City K and K-2. 24 p., 39 ill. (Catalogue K-3. Bay City Shovels Inc., Bay City, Mich.) Describes and illustrates two models of ½-cu. yd. convertible shovels listing features and specifications of each.

Shovels, Gas-Electric

50% Own Two or More! Bulletin, 4 ill. (The Marion Steam Shovel Co., Marion, O.) Describes gas-electric shovels of 1¼-cu. yd. capacity and points out advantages which include no clutches and non-stalling engines.

Shovels, Special

Bay City Convertible Cranemobile. 8 p., 11 ill. (Catalogue C-2. Bay City Shovels, Inc., Bay City, Mich.) Describes and illustrates a new adaptation of a crawler-mounted tractor shovel which may operate as a crane, shovel, clamshell, truck hoe, dragline or backfiller.

Tractors

"Salvaging a $60,000 Barge." 1 p., 1 ill. *(The Caterpillar Magazine,* Issue 52. Caterpillar Tractor Co., San Leandro, Cal.) Describes and illustrates how a tractor aided in saving a beached barge, owned by the Hawaiian Dredging Co.

Welding

"Huge Rock Crusher Repaired." 1 p., 3 ill. *(Oxy-Acetylene Tips* for September, 1930. Linde Air Products Co., New York, N. Y.) Describes and illustrates how a crusher casting weighing 55 tons was quickly restored to service on the West Coast.

Wire Rope

"Giant Tower Excavator Speeds Levee Work." 2 p., 4 ill. *(The Yellow Strand* for September, 1930. Broderick & Bascom Rope Co., St. Louis, Mo.) Describes and illustrates the use of a 130-ft. head tower and a 10-cu. yd. bucket in levee work at Clinton, Ia.

New Corporations

Mississippi Portland Cement Co., Philadelphia, Miss. W. S. Guest, Philadelphia, Miss.; B. R. Alford, vice-president and general manager, Canal Bank Bldg., New Orleans, La.

Mid-Continent Cement Co., care Frank B. Coleman, attorney, 506 Olive St., St. Louis, Mo. 20,000 shares com.

Louis Balduzzi Sons, Huntington, N. Y. F. J. Munder. $15,000.

Batesville Black Marble Co., Batesville, Ark. T. L. Thogmartin, president, Fort Scott, Kans.; O. K. Thogmartin, vice-president, Batesville, Ark.; George J. Terry, secretary-treasurer, Batesville, Ark. 750 shares n.p.v.

Dehli Foundry Sand Co., care P. L. Strange & Co., Chamber of Commerce Bldg., Cincinnati, Ohio. H. F. McVay and J. R. Ginn. $50,000.

Stroth Bros. Slag Co., Inc , Jackson, Ohio. I. C. Stroth, H. F. Stroth, L. B. Stroth, R. B. Stroth, and A. W. Stroth.

Clark Quarries, Inc., 1100 W. Magnolia St., Fort Collins, Colo. W. R. Clark and I. J. Dilts, owners. Limestone quarries at Owl Canyon, Bellevue P. O., Colo. $10,000.

Powers Construction Co., Milwaukee, Wis. Robert E. Powers.

Moulding-Brownell Corp., 20th floor, Builders' Bldg., Chicago, Ill. Merger of Thomas Moulding Brick Co.; Brownell Improvement Co., with plant at Thornton, Ill.; Federal Stone Co., with plant at McCook (La Grange P. O.), Ill.; Superior Stone Co., with plant at La Grange, Ill.; Wisconsin-Wilcox Co., with plant at Janesville, Wis.; American Sand & Gravel Co., with plants at Algonquin, Ill., Fontana and Wilmot, Wis.; Dickason Sand & Gravel Co., with plant at Cayuga, Ind.; and Richardson Sand & Gravel Co., with plants at Carpentersville, Ill., and Coleman (S. Elgin P. O.), Ill. J. R. Sensibar, chairman of board; W. P. Hodgkins, president; T. J. McGuire, vice-president-general manager; Daniel Foley, James W. Alder, and T. F. Quilty, vice-presidents; Daniel J. Gallery, secretary-treasurer.

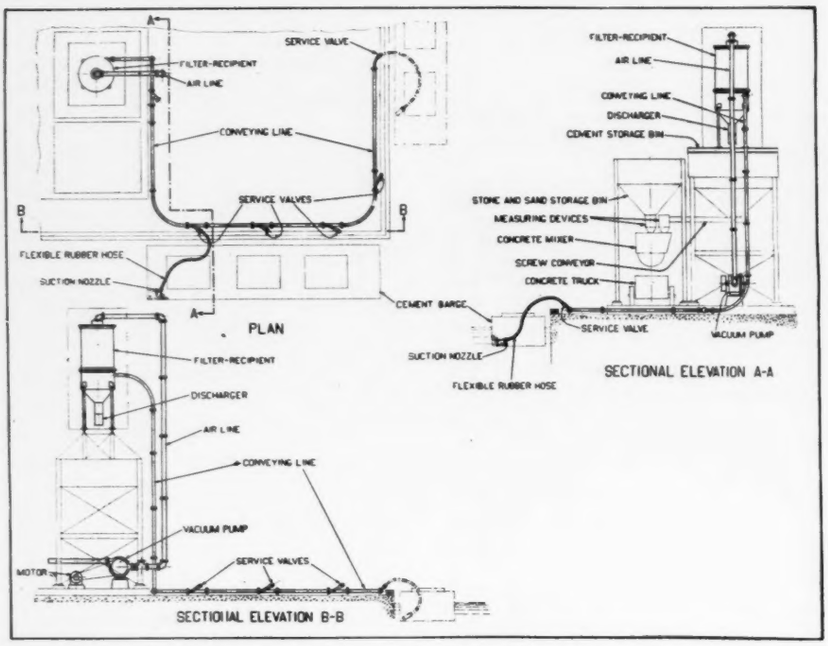


Diagram of cement-unloading system used by The Carleton Co., Inc.

Bulk Cement Unloaded by Pneumatic Conveyor

Complete equipment for receiving and handling cement received in bulk at the plant of The Carleton Co., Inc., has been supplied by Holly Pneumatic Systems, Inc., of New York, N. Y. Cement arrives in barges which can be placed on either the side or the end of the dock. A suction nozzle is attached to one end of a flexible hose and the other end is connected to a rigid conveyor-pipe which runs along the ground near the edge of the dock. Service valves permit easy attachment of the flexible hose. Cement entering the suction nozzle in the boat is drawn through the flexible hose and conveyor-pipe into the filter recipient. The discharger on the bottom of the filter recipient continuously ejects cement which drops directly into the cement-storage bin. Cloth bags in the filter recipient collect dust before the air passes out through the top to the vacuum pump which is on the ground.

No manual labor is involved in the operation except at the suction nozzle in the boat. Cloth bags in the filter recipient are automatically cleaned every few minutes without disturbing the operation in any way, the collected dust being discharged with the bulk of the material.

Besides the saving in price on bulk cement as compared to bag shipments, substantial economies result from the elimination of the handling and salvaging of empty bags. There is no loss of cement at any point. The nuisance of dust around the plant getting into the bearings of machinery is obviated.

Over 60,000 bbl. of cement have been received and probably another 150,000 bbl. will be consumed before the construction work is completed.

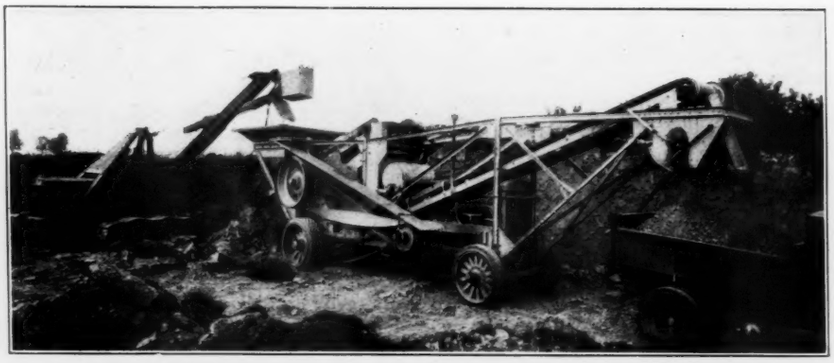
Portable Plant Crushes, Screens, Loads Gravels

August C. Kopplin, of Green Lake, Wis., is engaged in preparing gravel for surfacing township highways. Two years ago he purchased a Crushermobile, made by the Good Roads Mchy. Co., Kennett Square, Pa. With this self-contained, portable equipment he produces an unusually uniform ¾-in. grade of road material at the rate of 1,500 to 2,000 cu. yd. per week. On three different days, last year, his production was in excess of 400 cu. yd. of 1¼-in. material.

This machine often makes two or three moves per week, from one pit to another, and a move seldom requires more than two or three hours.

A ¾-cu. yd. Universal shovel is employed to handle the bank material to the Crushermobile. It is a simple matter to propel the crushing plant close to the bank and the shovel. He was able to cut the operating force from six men to three men and to double his production by adopting this machine.

Earl Seymour, of Porterfield, Wis., has another of these machines which attracts the interest of township officials and contractors throughout his vicinity.



Portable crushing plant owned by August C. Kopplin.

This self-contained plant is operated by Earl Seymour.

Pit and Quarry

With which is consolidated

CEMENT-MILL & QUARRY

Member Audit Bureau of Circulations

Read in Largest Number of Plants

Vol. XX | SEPTEMBER 24, 1930 | No. 13

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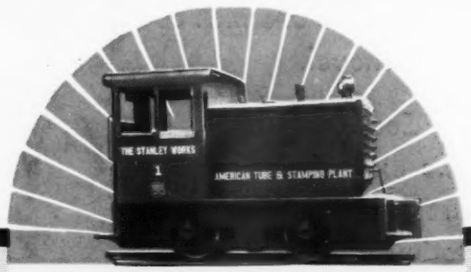

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Dependability and low cost maintenance are yours with a **PORTER**

Porter owners attest to the truth of that statement. The true cost of any locomotive is what it costs to keep it running over a span of years.

For 65 years Porter Locomotives have been showing the way in long life and dependability.

PORTER "better built" locomotives

H. K. PORTER COMPANY
ESTABLISHED 1865
PITTSBURGH PENNSYLVANIA

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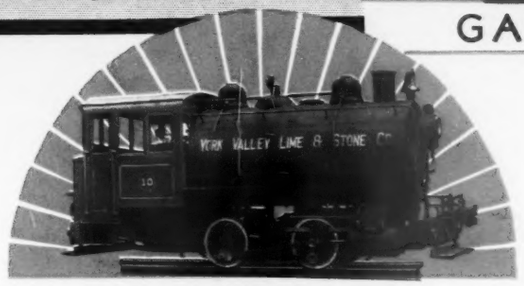
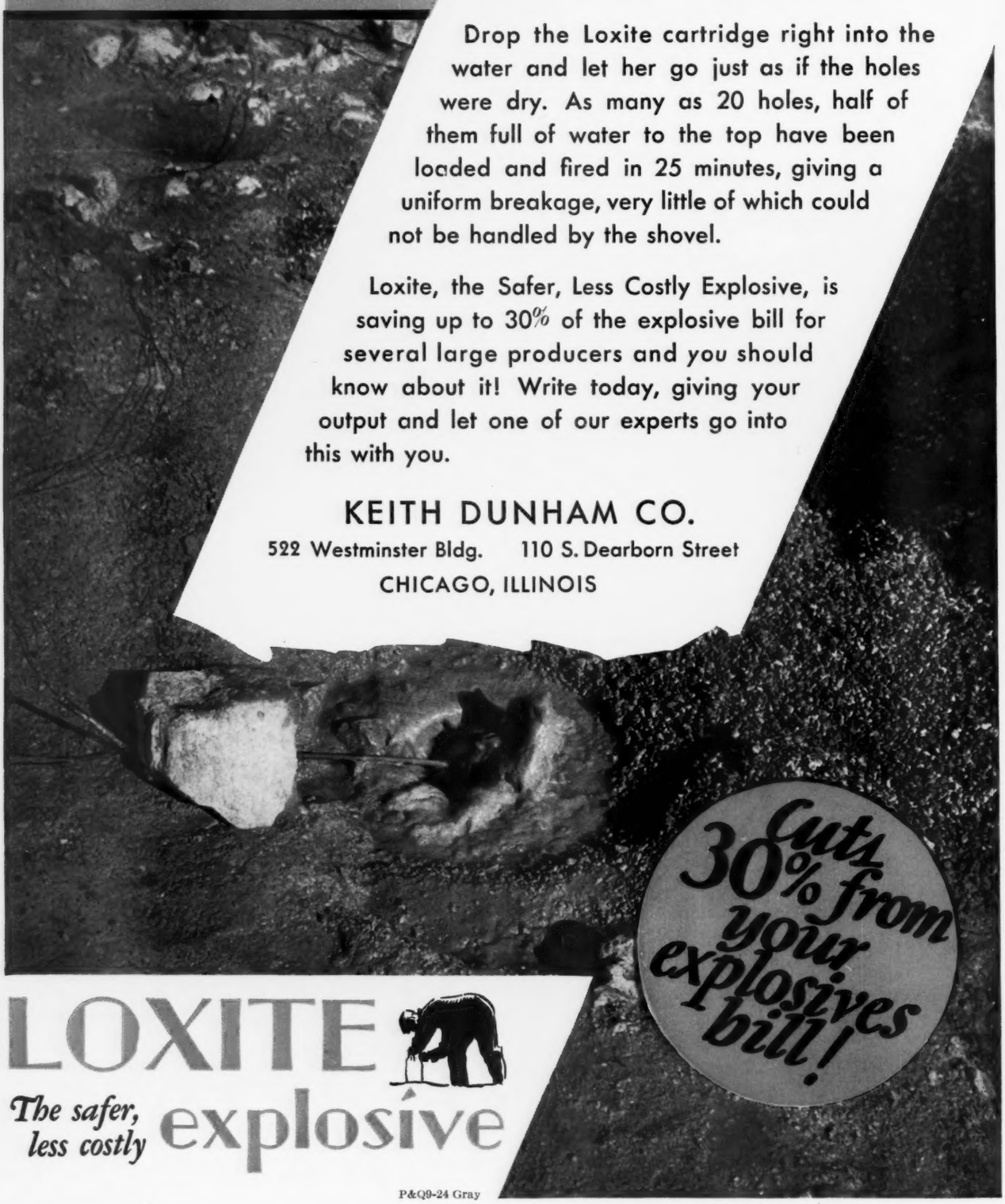


STEAM

SINCE SEPT. 11, 1929, LARGEST NET PAID CIRCULATION IN THE FIELD
(See A. B. C. Publisher's Statement or Audit Report for Details)

USE THIS LOW COST EXPLOSIVE in water, too!



Drop the Loxite cartridge right into the water and let her go just as if the holes were dry. As many as 20 holes, half of them full of water to the top have been loaded and fired in 25 minutes, giving a uniform breakage, very little of which could not be handled by the shovel.

Loxite, the Safer, Less Costly Explosive, is saving up to 30% of the explosive bill for several large producers and you should know about it! Write today, giving your output and let one of our experts go into this with you.

KEITH DUNHAM CO.

522 Westminster Bldg. 110 S. Dearborn Street

CHICAGO, ILLINOIS

30% cuts from your explosives bill!

LOXITE

The safer, less costly explosive

P&Q9-24 Gray

A Super Loading Machine

1930 MODEL

WE *invite you to become acquainted with*—

- The new feeder, which combines digging, lifting, and conveying action — the most efficient ever put on a loader.
- The longer crawler with new cast steel frame, the added travel rolls–literally a crane crawler.
- The heavier elevator, so easily adjusted and collapsed.
- The many so-called "little improvements" which have so much to do with the life and repair bills of a machine.

Any loader user will be interested to know of the 1930 Model Link-Belt "Grizzly" Loader, *and to check up on the improvements we have built into it.*

COUPON WILL BRING YOU THIS INFORMATION

THE LINK-BELT "GRIZZLY" LOADER

P.&Q.

LINK-BELT COMPANY
2045 W. Hunting Park Ave., Philadelphia, Pa.

Please send me a copy of Folder 1149, describing the "Grizzly" Loader.

*My Name*_____

*Firm*_____

*Address*_____

*City*_____ *State*_____

Where traction *means* yardage

THE scraper fills quickly in soft soil—there is need for the full power of the dependable engine in the "Caterpillar" Tractor. The long, wide tracks of the "Caterpillar" ripple over the surface of the soft soil with no wasteful slip. Tractor and scraper go into the corners, climb the steep grades, ride the soft places—handling yardage for the earth-mover and contractor with a saving of men, money and minutes.

• • •

Prices—f. o. b. Peoria, Illinois

TEN	$1100	TWENTY	$1900
FIFTEEN	$1450	THIRTY	$2375
SIXTY	$4175		

Caterpillar Tractor Co.

PEORIA, ILLINOIS *and* SAN LEANDRO, CALIF., U. S. A.
Track-type Tractors ' Combines ' Road Machinery
(There's a "Caterpillar" Dealer Near You)

CATERPILLAR
REG. U.S. PAT. OFF.
TRACTOR

In Hard, Sun-baked Moulding Sand

at the pit of Geo. F. Pettinos,
Mount Holly, N. J.

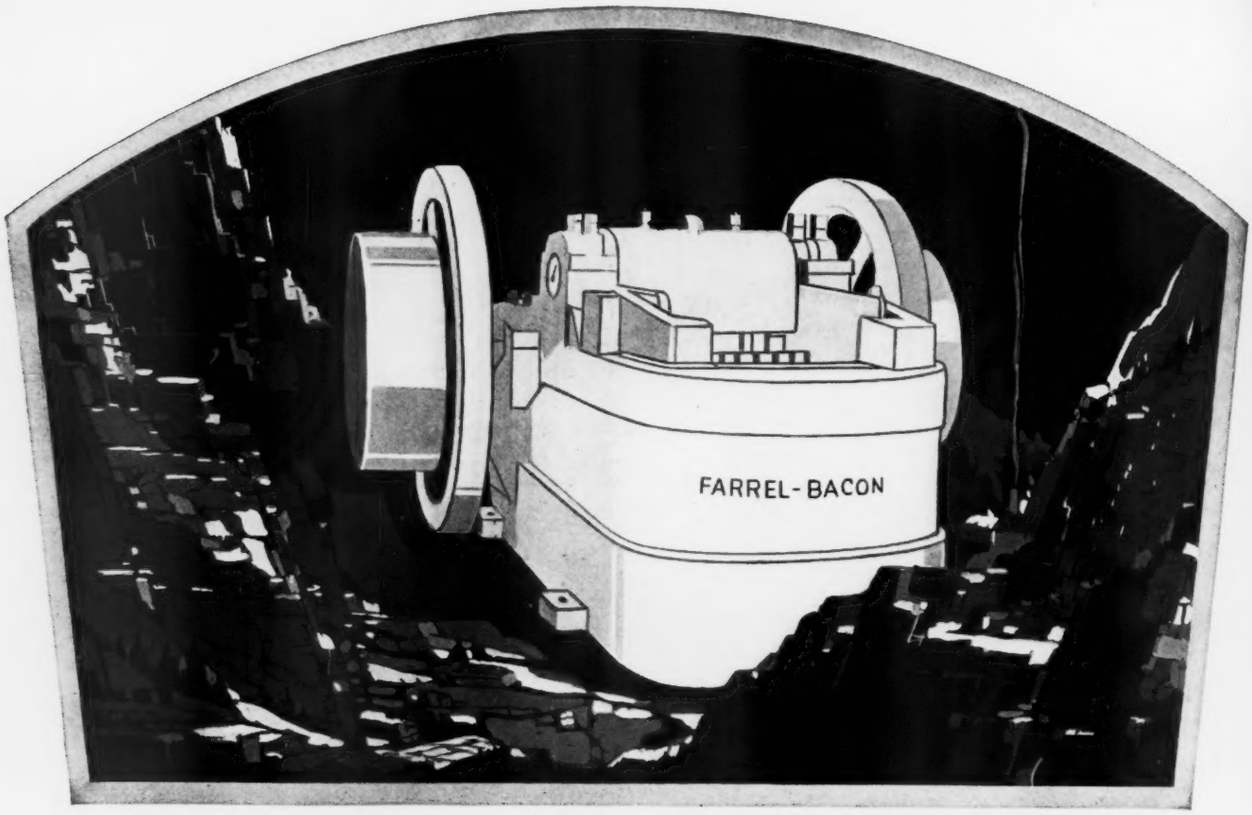
Six men were used at this one face, spading out the hard moulding sand and loading the small truck in about 15 minutes.

Now one Nelson Q-7 loads the truck in 1 to 1½ minutes, not with great lumps, but well broken up and uniformly mixed.

This Nelson Q-7 loader itself does the work of sixty-odd men. With more than twice the former output the total cost has been cut to one-third and the unit cost to one-fifth of the former figures.

The N. P. NELSON IRON WORKS, Inc.

824 Bloomfield Avenue **Passaic, N. J.**



The FARREL-BACON 36″x24″ Double-Duty Crusher Best for Plants of Moderate Size

The fine production record of the 36″ x 24″ in plants of moderate size, has made this unit the most popular of the FARREL-BACON medium size crushers.

This sturdy crusher, weighing 79,000 pounds, has a crushing angle which will efficiently produce stone when jaw opening is set to 1½″, and serves in many cases as a primary and also a reduction unit.

In the thirty years since the solid, one-piece casting was adopted, no frame has ever been broken. Like all other FARREL-BACON Crushers, the 36″ x 24″ is built with greater strength than will ever be required of it.

The FARREL-BACON 36″ x 24″ No. 15B will reduce 1500 tons to 4 in., 800 tons to 3 in., 725 tons to 2½ in., and 500 tons to ½ in., per ten-hour working day.

A new booklet just published by Earle C. Bacon, Inc., contains illustrations and descriptions of the various types of Crushers and other stone crushing equipment manufactured by this Company. We suggest that you write for it.

FB CRUSHERS

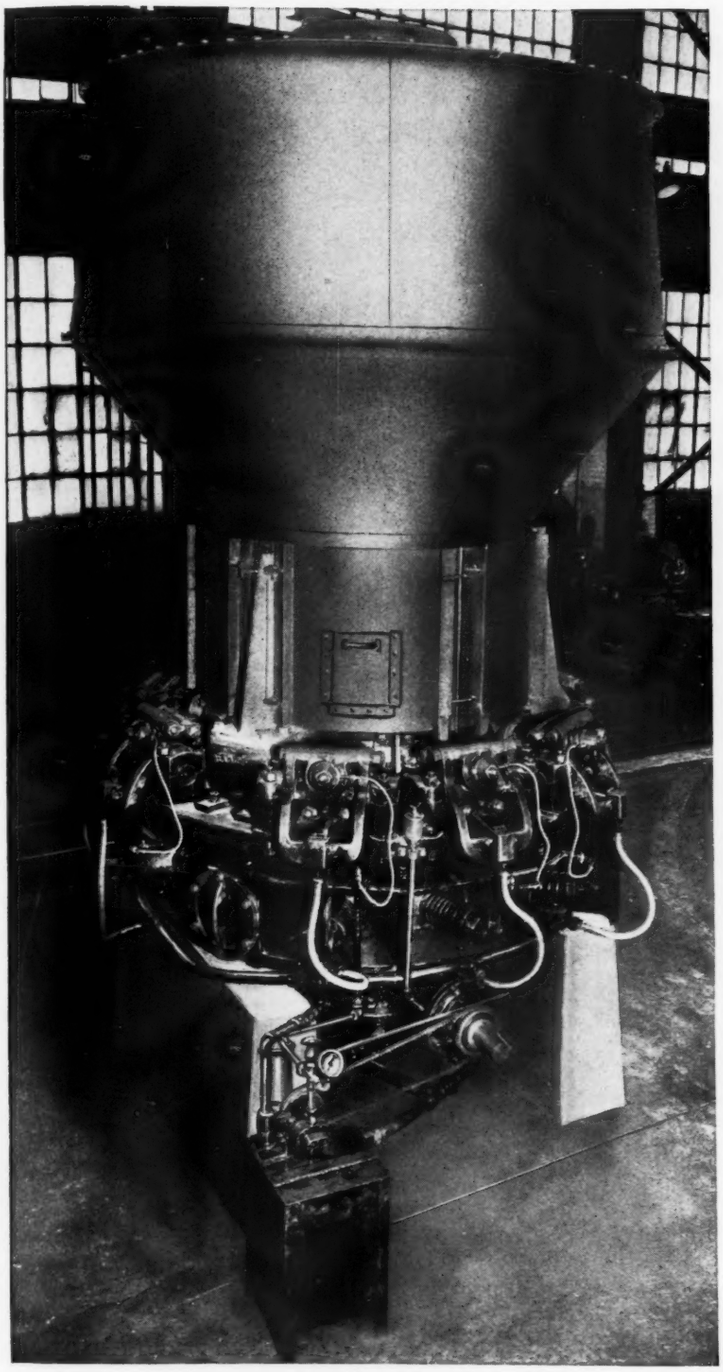
FARREL-BACON CRUSHERS

EARLE C. BACON *Inc.*

Engineers to the Stone Crushing Industry

26 CORTLANDT ST., NEW YORK. N.Y.

It does its job well



The Bethlehem Pulverizer does its job well regardless of the type of service you demand. You may require long, continuous performance, or short, intermittent grinding. You may grind hard, tough material, or a soft, brittle product. Still the Bethlehem Pulverizer continues to deliver the desired amount of material, ground to a constantly uniform fineness.

The remarkable performance of the Bethlehem Pulverizer is due to the sound principles on which it is based, and to the special features it embodies. The machine is very heavily constructed to insure many years of hard service. A screw feeder brings a continuous flow of material to the grinding chamber. It is the one pulverizer which always delivers a product of uniform fineness; because, regardless of the degree of wear that may occur between the rollers and the table tracks, the area of contact remains the same.

Further, adjustments are made without stopping the machine. Repairs and replacements take less than half the time ordinarily required, due to the easy accessibility of every part. And the Bethlehem Pulverizer uses from 40 to 50 per cent less power than other machines.

Bethlehem engineers will gladly discuss the suitability of the Bethlehem Pulverizer to your requirements.

BETHLEHEM STEEL COMPANY

General Offices: Bethlehem, Pa.

District Offices: New York, Boston, Philadelphia, Baltimore, Washington, Atlanta, Pittsburgh, Buffalo, Cleveland, Cincinnati, Detroit, Chicago, St. Louis

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BETHLEHEM

PULVERIZER

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GREEN BOOK

Keeps You in Touch with Markets in the Fertilizer Field

The Fertilizer GREEN BOOK, published monthly, is a progressive and helpful news and editorial service offered to all producers and mixers of fertilizer and fertilizer materials.

If you produce any of these materials:

Gypsum (Land Plaster)
Agstone (Lime Stone)
Phosphate Rock
Lime
Marl

you should read the Fertilizer GREEN BOOK regularly. It is the one practical method of keeping in touch with this great field and its markets.

If you offer:

Machinery
Supplies
Service

to the fertilizer industry the Green Book can be a great aid.

Progressive producers, manufacturers and distributors of fertilizer, fertilizer materials, etc., read the GREEN BOOK each month. That is why it is the best advertising medium for manufacturers of machinery and supplies and for those who offer a special service to the fertilizer industry.

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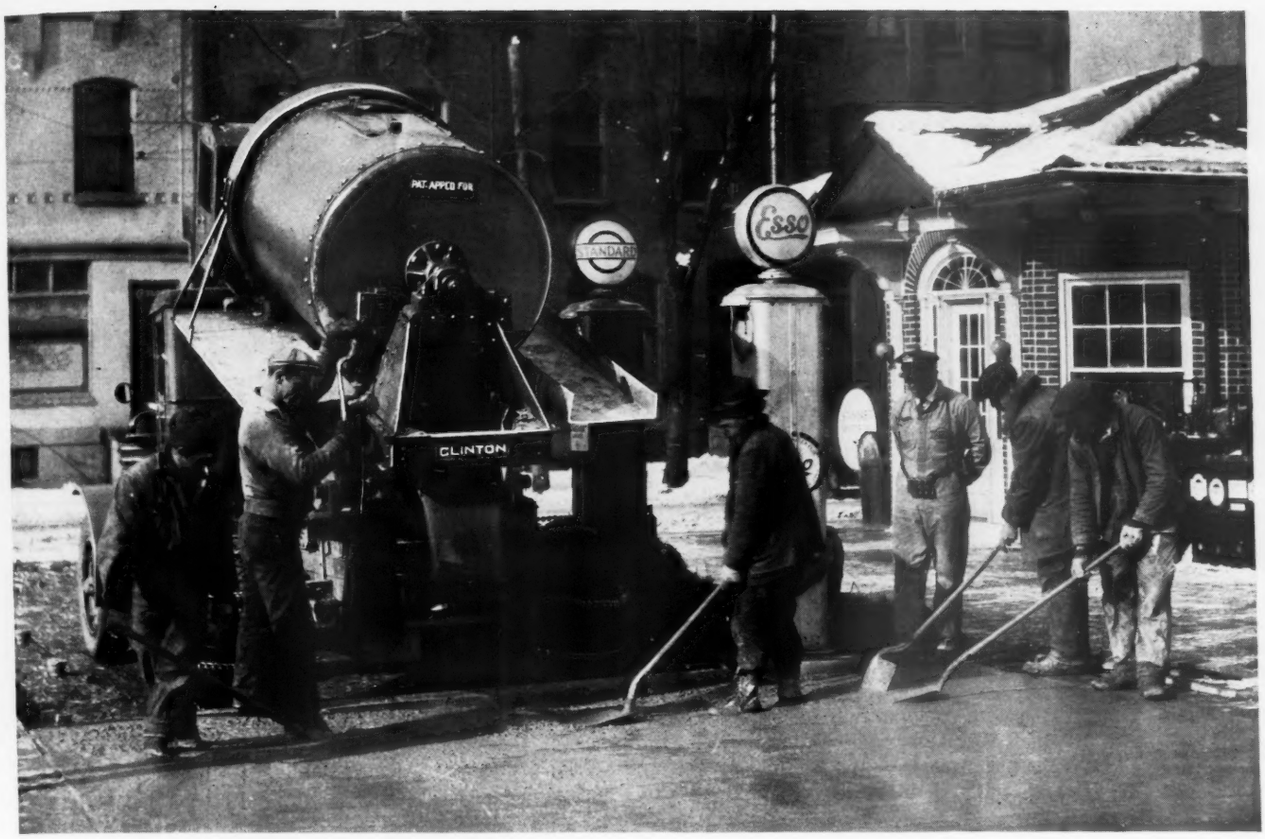

Laying a filling-station pavement for the Standard Oil Co. of Penna. Concrete hauled in Clinton Conveyor-Conditioners.

Quality Paving in Winter

EVEN a pavement can safely be laid in winter, using preheated, ready-mixed concrete.

And if the concrete has been processed during haulage the CLINTON way, the concrete is both stronger and more uniform than would be possible otherwise.

Only by the Clinton Process is concrete brought to its maximum strength. That process not only prolongs the mixing till the batch is perfectly homogeneous, but it also expels the air churned in by the mixer blades. Clintonized concrete is from 10 to 20 percent stronger than non-Clintonized concrete of the same proportions.

Yet Clintonizing adds nothing to the cost of preventing segregation. The Clinton Conveyor is just a round tank, slowly rotated by a separate gasoline engine that doesn't mind traffic stops; plus gears and clutch.

You can sell the Clintonized product at a better price, based on better quality. Contractors like it because it saves them all the bother and risk of field mixing. Both ways—you gain a better profit.

Ask us for the whole story.

Diagram shows how Clintonizing expels air entrained in mixing.

CLINTON MOTORS CORPORATION
Noble & Grace Streets Reading, Pa.

"CLINTONIZING"
(PROCESS PATENT APPLIED FOR)

The Final Touch to Ready-Mixed Concrete

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A great many favorable comments received. Read a few of them:

"A Real Text Book."
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"Valuable to Buyer as well as Producer."
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Alphabetical list of producers and manufacturers, giving *all* important information. No duplication. Geographical list of individual plants including all necessary data. Equipment Catalogue Index and Buyer's Guide. Manufacturers' catalogue descriptions of complete line of pit, quarry and mill machinery and supplies. Manufacturers' Trade Names; Trade Associations; etc.

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The GREENVILLE STACKER

(Patented Oct. 15, 1929)

The LARGEST, LONGEST and MOST FLEXIBLE, PORTABLE BELT CONVEYOR on the Market

Tilts to any angle,
Full revolving like a steam shovel,
Mounted on self-propelling crawlers,
Built in any width, length and capacity,
Conveys from anywhere to a high ground storage pile.

24 inch x 120 foot STACKER piling gravel and sand at the Ford Road Yard of the American Aggregates Corporation at Detroit, Michigan

The GREENVILLE STACKER is low in maintenance, is efficient and positive. It is especially adapted to the storing and reclaiming of sand, gravel, stone, slag, coke, coal, dirt or any commodity that a belt conveyor will handle. It can be driven electrically or by gasoline motor.

Each machine is designed to suit the conditions and capacity by the

F. M. Welch Engineering Service, Inc., Greenville, Ohio

and manufactured by

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PIT AND QUARRY

Research Department

538 South Clark St., Chicago, Ill.

Please send me catalogs and prices concerning the following items checked below:

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- ☐Agitators, Slurry
- ☐Air cleaners
- ☐Air compressors
- ☐Bag filling and weighing machinery
- ☐Bags, cloth
- ☐Bags, paper
- ☐Balls, steel
- ☐Barges, steel
- ☐Belt dressing
- ☐Belt fasteners
- ☐Belting, conveyor and elevator
- ☐Belting, transmission
- ☐Belt lacing
- ☐Belt plates
- ☐Belt rivets
- ☐Belt tighteners
- ☐Bin gates
- ☐Bins, concrete
- ☐Bins, steel
- ☐Blasting supplies
- ☐Blasting powder
- ☐Blocks, friction
- ☐Boats, self-unloading
- ☐Bodies, Motor Trucks
- ☐Brake Linings
- ☐Buckets, Clamshell
- ☐Buckets, Conveyor and Elevator
- ☐Buckets, Dragline
- ☐Buckets, Orange Peel
- ☐Cableways, Slackline
- ☐Calcining Machinery
- ☐Car Dumpers
- ☐Car Pullers and Movers
- ☐Carriers, Belt
- ☐Cars, Dump
- ☐Cars, Kiln
- ☐Castings, Manganese Steel
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- ☐Chains, Conveyor and Elevator
- ☐Chains, Power Shovel, Crane and Dredge
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- ☐Clutches, Magnetic
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- ☐Draglines, Revolving Boom
- ☐Dredges, Dipper
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- ☐Dredges, Ladder
- ☐Drill Sharpening Machinery
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The 26 numbers of Pit and Quarry issued during the year contain information on every phase of your interest as an operator, and therefore constitute a veritable library well worth preserving for reference purposes. Do you preserve your copies of Pit and Quarry?

Many operators mark articles, paragraphs and statistics, here and there, in each number before filing . . . to find, after months, that they are in need of this information; whereupon they glance through their "library" and readily resurrect the "lost" information. Try it!

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Every
Belt
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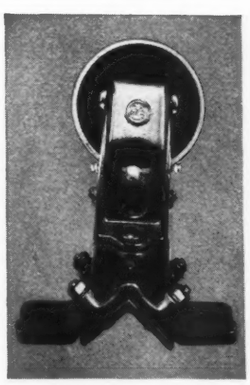
S-A
CARRIERS

See them for yourself

If we could take you personally to inspect an installation fully equipped with S-A belt conveyors your reaction would certainly influence you to favor these rugged carriers.



You would immediately be imbued with a substantial confidence in S-A carriers. Then, too, their smooth, quiet operation reflects in their remarkable service records for handling materials at low cost per ton.

Stephens-Adamson Mfg. Co.
Aurora, Illinois
Los Angeles, California Belleville, Ontario, Canada

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Stephens-Adamson

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During 1929 the number of men that subscribed to PIT AND QUARRY increased by 81.4%.

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More men in your line of business read PIT AND QUARRY than read any other trade paper.

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Pit and Quarry

With which is consolidated

CEMENT-MILL & QUARRY

Member Audit Bureau of Circulations

Reaches Largest Number of Plants

538 S. Clark Street, Chicago, Ill.

Now They Make a Profit

Because of oversize rock, the Arkadelphia Sand and Gravel Co., Arkadelphia, Ark., found it very unprofitable and nearly impossible to operate their 10-inch dredge pump. So they installed a 40 ft. EAGLE "SWINTEK" SCREEN NOZZLE LADDER, and have operated profitably ever since. The "SWINTEK" successfully screens out their oversize, and prevents all stoppages.

The EAGLE "SWINTEK" SCREEN NOZZLE LADDER is a profitable investment on any sand and gravel dredging operation. The endless chain keeps the oversize away from the nozzle, and the cutting and agitation insures a regular feed flow of solids. Aggregate not workable by a plain suction pipe line is torn loose, and the oversize easily screened out. Structurally strong and correctly designed for long, hard service, the EAGLE "SWINTEK" assures uninterrupted operation, high efficiency, and lowered power costs.

Send for Complete Information.

EAGLE WASHERS

EAGLE Sand and Gravel Washers produce clean sand and gravel—free from all foreign materials. Write for full details.

See P▪Q HAND BOOK Pages 38 and 560.

ARKADELPHIA SAND & GRAVEL CO.
INCORPORATED
WASHED GRAVEL AND SAND

August 21, 1930

Received AUG 25 1930
How Answered
By
Date

Eagle Iron Works,
Des Moines, Iowa.

Gentlemen:-

I have instructed our local photographer to mail you two or three views of the " Swintek " ladder we have in operation at this time and also want to say a word about the success we have had with same.

We started operations with our 10" pump in August 1929 but due to oversize rock we found it very unprofitable and nearly impossible to operate. We then installed the ladder and to date it has proven very successful in screening out the oversize and preventing stoppages. Hoping this is in line with your request and also thanking you for service given on our miscellaneous orders, we beg to remain,

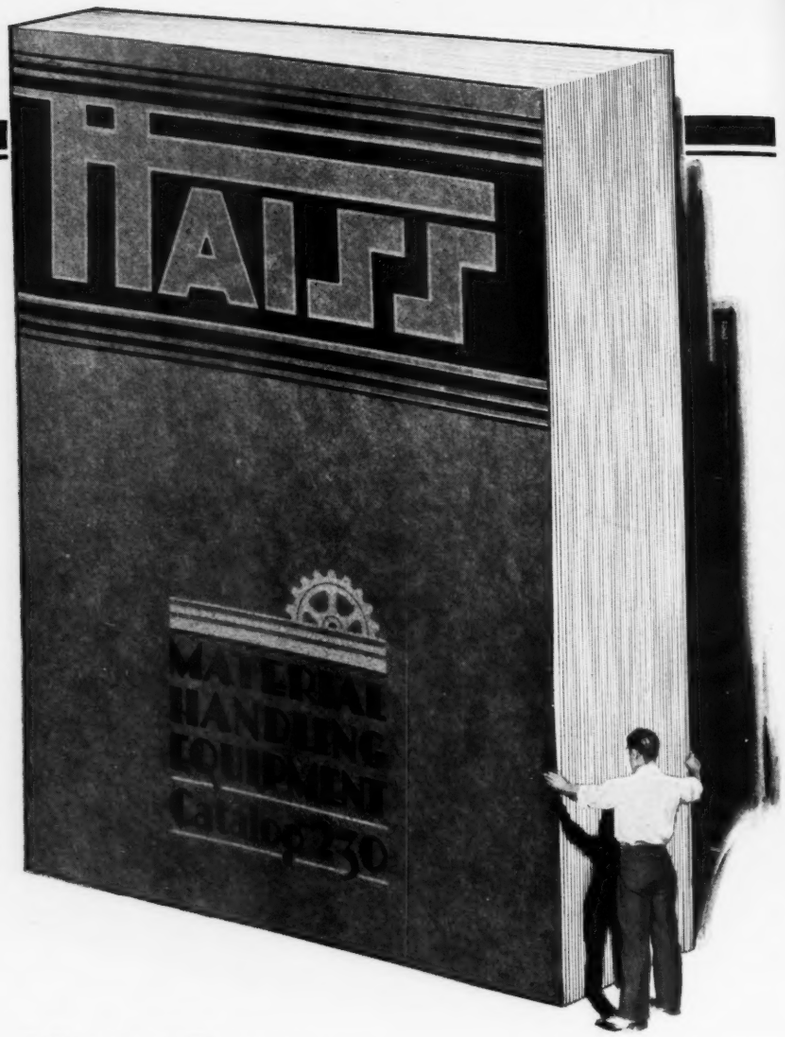
Yours very truly,
Arkadelphia Sand & Gravel Co.
Clarence E Hawkins
Manager.

EAGLE IRON WORKS

129 HOLCOMB AVE. -:- **DES MOINES, IOWA**

On Your Desk - -

this book will be a ready reference on a line of material handling equipment intended for the needs of your particular business. 88 pages, closely packed with condensed information, tables, ratings and practical help for specifying equipment.



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H-693

The Crusher with Troubles Left Out

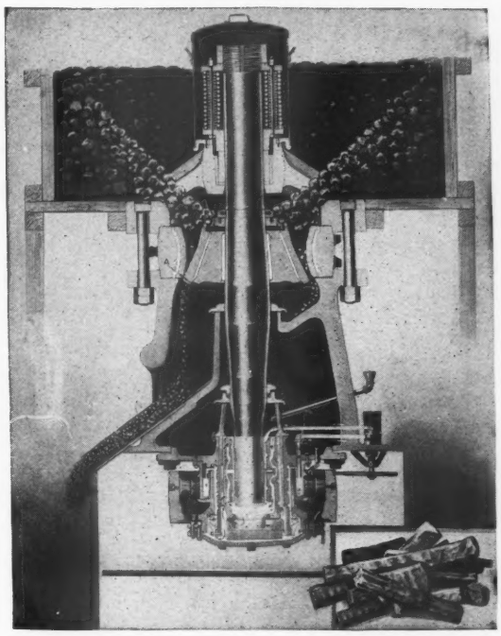
Kennedy Ball Bearing Gearless Gyratory Crusher

Guaranteed to do more crushing, size for size, of a given product, and with less power, than any other crusher ever built.

The only crusher operated without gears. Entire energy is completely applied to crushing the rock, and all dead weight is carried on ball bearings.

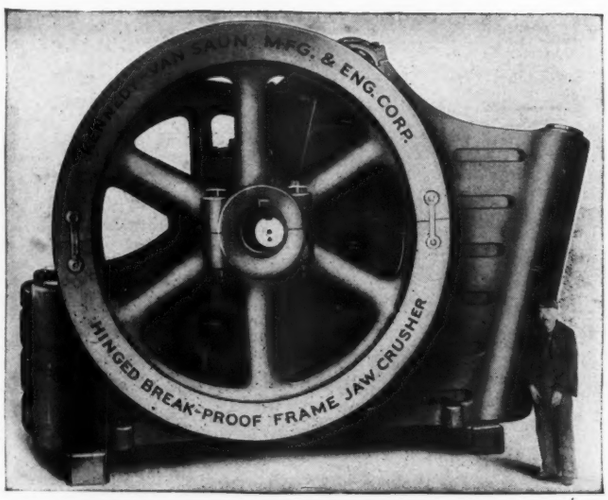
The head and shaft of this crusher may be suspended on springs so that when a piece of steel larger than the discharge orifice enters the crusher, the springs are compressed, permitting the head to move downward and allowing the steel to pass through without damaging the crusher.

Our patented ball and socket self-aligning shaft bearing allows the babbitt to last 10 to 20 times longer than that of rigid eccentric crushers. The saving effected is approximately 80% in cost of maintenance. There is less slippage and more grip on heads and concaves because of the small angle of nip. Very low power requirements, due to absence of friction, as the stone is broken instead of being ground, which reduces abrasion of the wearing parts to a minimum. The operation may be by a Synchronous Motor, having 100% starting torque, built in the pulley, or by belt from a standard motor.



Built in popular sizes, with Receiving Openings from 4¼ to 14 inches. Production sizes from ⅛ in. to 1½ inches. Capacity up to 620 tons per hour on larger sizes.

Kennedy Break-proof Frame Jaw Crusher



Special Features

Hinged break-proof frame of all steel construction in the larger sizes. Sizes having jaw opening 24 inches and up, are made with sectional frames. Smaller sizes have a single piece semi-steel frame. Side frames are joined to back and front members by massive steel shafts. No bolts used to hold frame rigid. Guaranteed against frame failure, where 90% of breakage occurs in jaw crushers. Positive pressure lubrication to all moving parts.

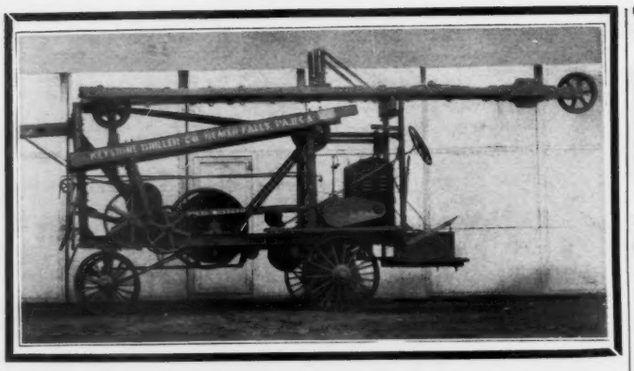
Maximum service under severe conditions. Low friction, reduced power consumption. Jaw openings 10x7 to 96x66. Production sizes from 2½ inches to 10 inches. Capacity up to 1000 tons per hour.

Give us details regarding your problem, and our recommendations will be mailed promptly. Interesting literature on primary gyratory crushers, ball mills, rod mills, elevating and conveying equipment, await your request.

KENNEDY-VAN SAUN MFG. and ENG. CORP.

No. 2 Park Avenue, Suite 2450 **New York, N. Y.**

BRANCH OFFICES:—Chicago; 120 South La Salle St. Birmingham, Ala.; Comer Building. Boston, Mass.; 737 Statler Bldg. Los Angeles, Calif.; 414 South Spring St. London, England; Bush House. Paris, France; 40 Rue des Mathurins. Johannesburg, S. Africa; 73 Cullinan Bldg. Canadian Agents, Canadian Fairbanks-Morse Co., 980 St. Antoine St., Montreal, Que. Walkers Limited, Maryborough, Queensland, Australia. Cuban Agents, Gerard Jansen Y Cia, Compostela 43, Havana, Cuba.



KEYSTONE 1½ BH

A Most Economical Drill

Mass production methods enable us to offer this new all steel frame, blast hole drill at a price decidedly lower than we have been able to reach for any traction drill during the post-war period.

The frame is built entirely of steel, with walking beams and derrick of wood. Dual Rubber Cushion Shock Absorbers, which make the rig operable with wire drilling cable, are an outstanding economical improvement. The saving in cordage expense alone will run from 75% to 90%.

The 1½ BH weighs under 11,000 lbs., and is powered either with a 20 H. P. 4-cylinder gas engine, or an equivalent electric motor. It will swing effectively a 1600 lb. drilling tool. Steel tires are standard equipment, but rubber tires can be supplied at a small extra cost.

Write us regarding your special requirements and conditions.

See Pit and Quarry HANDBOOK, Page 88.

TRADE MARK
KEYSTONE
REGISTERED U. S. PATENT OFFICE

KEYSTONE DRILLER CO.
BEAVER FALLS, PA.
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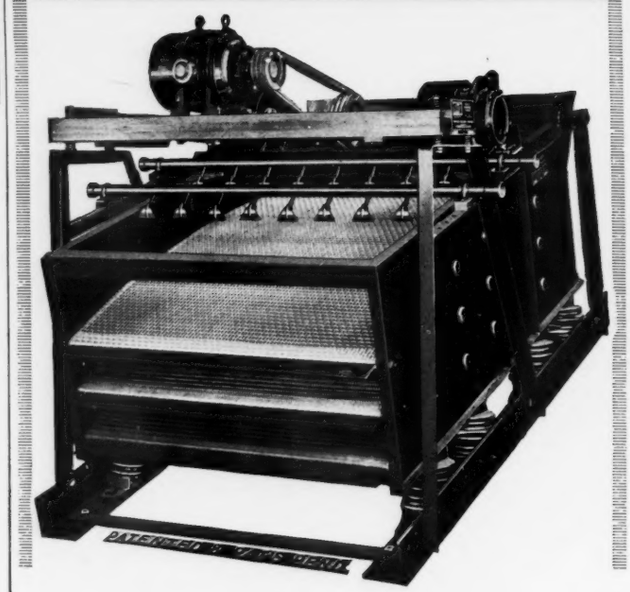
Arlington, New Jersey — Joplin, Missouri
Waukegan, Illinois — Birmingham, Alabama

PLAT-O



Adds Extra Dollars To Your Profits

THE PLAT-O Vibrating Screen will add considerably to your profits by giving you maximum tonnages of accurately graded materials without the usual production delays and shut-downs for adjustments and repairs. It is constructed to withstand the hardest kind of service, and its efficiency will please even the most skeptical.

The differential, horizontal, conveying action permits installation and operation at a much flatter screening angle than is possible with other vibrating screens. This flat screening angle is the principal factor contributing to the high screening efficiency, large capacity and general economy of operation of PLAT-O Screens.

PLAT-O Screens for every purpose—in single, double or triple deck types. Write for Bulletin No. 21.

See P&Q HANDBOOK Page 228

DEISTER MACHINE COMPANY
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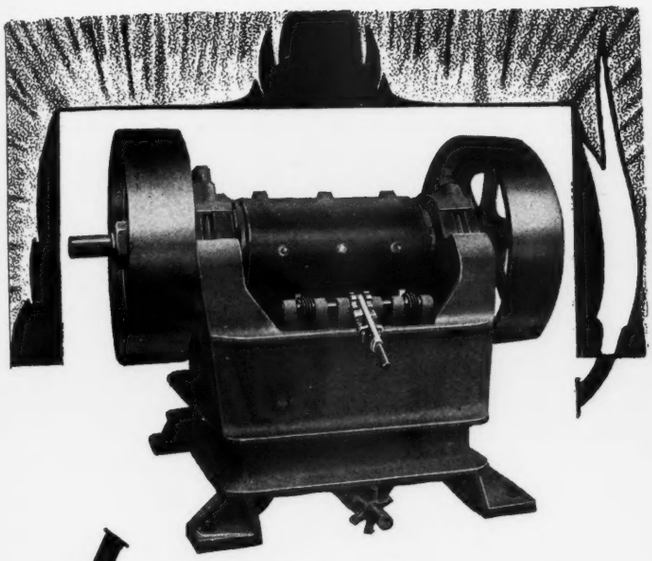
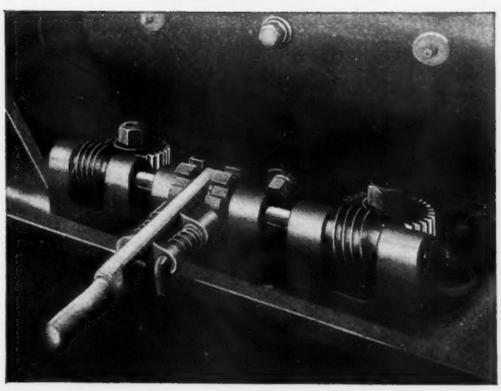


Double Screw Adjustment

THE Wheeling is the only crusher featuring the double screw used for adjusting of the wedge block to make possible the accurate reduction of material to any predetermined size. A single lever control is designed to raise or lower wedge block equally at either end or each end independently of the other.

This action insures positive alignment of toggle plate in all positions—a very desirable feature in reducing breakage.



Wheeling Mold & Foundry
Division of
Continental Roll & Steel Foundry Co.
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Low Center
of Gravity=High Stability

The
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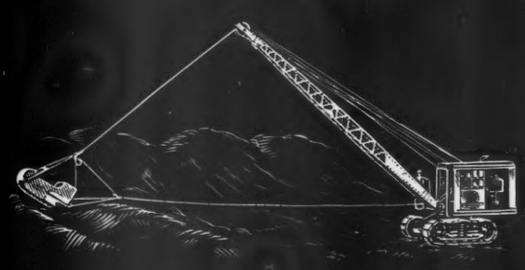
Shovel-Crane



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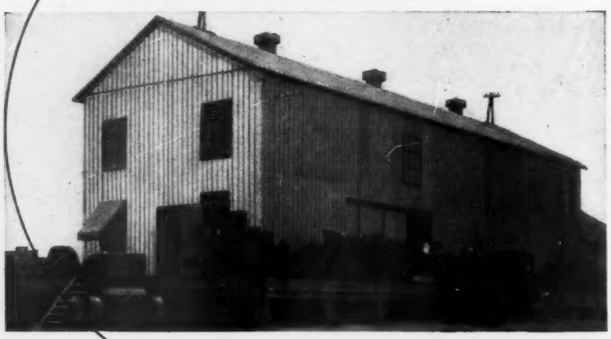

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Economical Shelter For Mining Operations

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more so than any other fire safe type of construction are Butler Ready-made Steel Buildings.**

Their standardized unit design makes possible transporting to location by pack train if necessary. Complete materials, ready-made, lets erection go forward without interruption, and by whatever labor crews are available. Permanence is inwrought in both materials and construction yet the structural design permits enlarging, taking down and re-erecting. Made entirely of steel Butler Steel Buildings are fire safe, off-setting lack of full fire protection at remote locations.

Butler Ready-made Steel Buildings are used extensively for living quarters—cottages, hotels, mess halls and bunk houses. Opposite is pictured a two family Bungalow insulated within and affording real comfort.

A new booklet picturing installations of many types of Butler ready-made Steel Buildings awaits your request.

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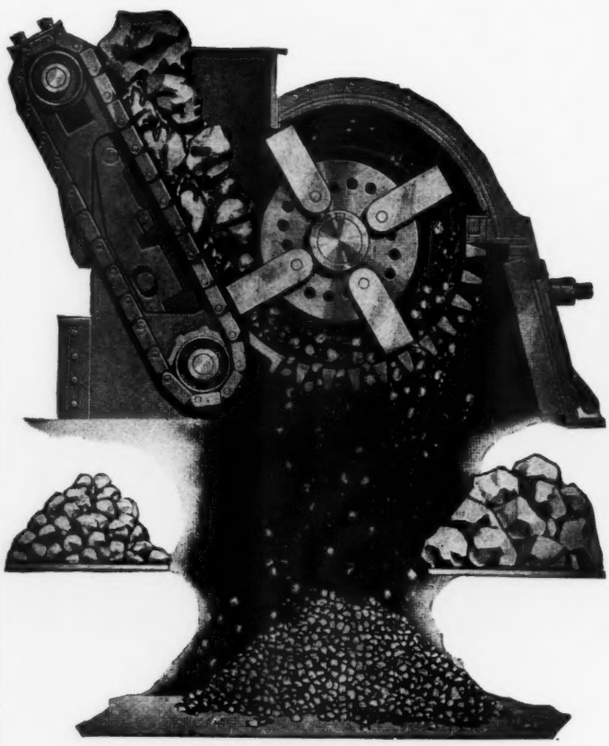
Even Under Most Unfavorable Conditions

The Dixie Mogul Non-Clog Hammermill is a simple, sturdily constructed swing hammer crusher, pulverizer or grinder that incorporates distinct time, labor and money saving principles found in no other equipment on the market today.

The specially designed, continuous moving breaker plate definitely solves the problem of reducing soft and sticky materials. This exclusive non-clog feature, adaptable to any type of Dixie Hammermill, assures an everlasting, continuous operation with the minimum amount of labor and power.

The rugged and simple construction of every Dixie Hammermill Unit guarantees long life and uninterrupted service—even under the most unfavorable conditions.



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DIXIE
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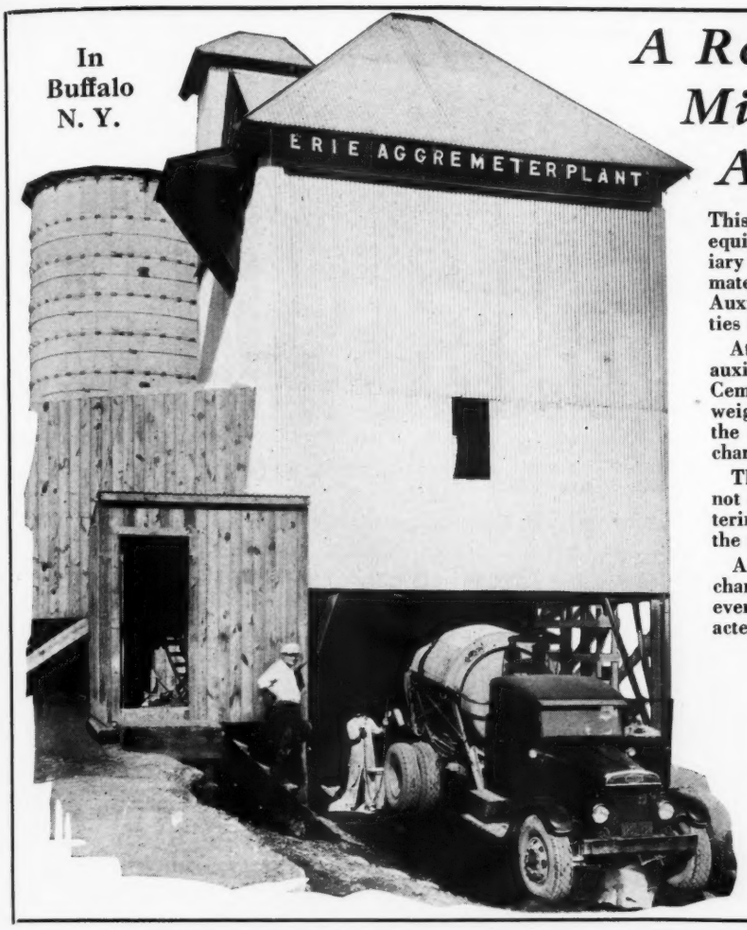

A Real Device to Load Mixer Trucks with Accuracy and Speed

This installation consists of a four compartment bin equipped with an Erie Weighing AggreMeter, Auxiliary Dial, and Scale having a separate beam for each material. Underneath the AggreMeter is mounted an Auxiliary hopper and a charging hopper which empties the material directly into the truck.

At the top and left of the photo is shown the cement auxiliary hopper. This hopper feeds into an Erie Cement Weighing AggreMeter. After the cement is weighed it empties into a separate compartment of the auxiliary aggregate hopper, which feeds into the charging hopper and the truck.

The entire outfit is self-cleaning. The cement does not come in contact with the aggregates until it is entering the truck. The aggregates and the cement enter the truck in the correct proportions.

A complete cycle of weighing the aggregates and charging the truck with 3 cu. yds. of material is made every 3 minutes. Fast operation such as this is characteristic of Erie equipment.

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Erie Steel Construction Co.

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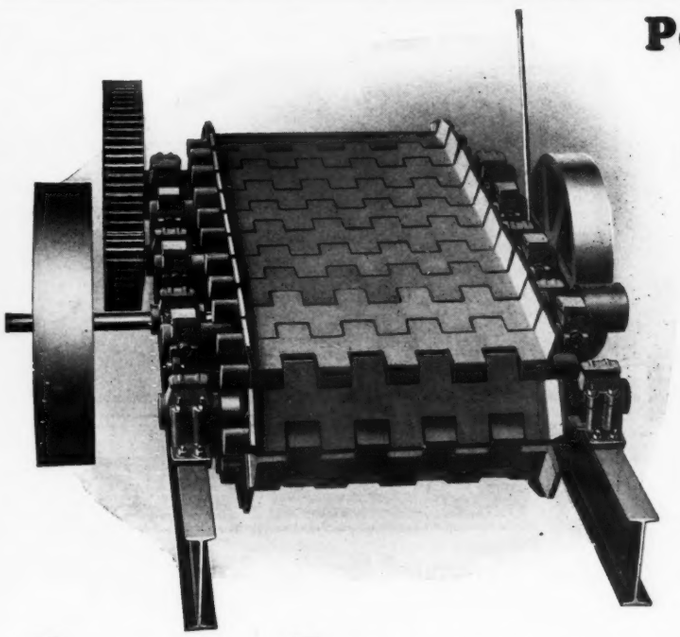

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This All-Steel Heavy Duty Apron Feeder is recommended for the severest service, being designed with extra heavy proportions to withstand the shock due to the fall of large rock. The amount of rock entering the crusher is always under positive control when this feeder is installed ahead of the crusher, with a minimum of choking. Built in sizes up to 72 in. x 16 ft.

A crusher feeder is special equipment, and Traylor Engineers will be glad to help you in making a proper choice. Send for full information.

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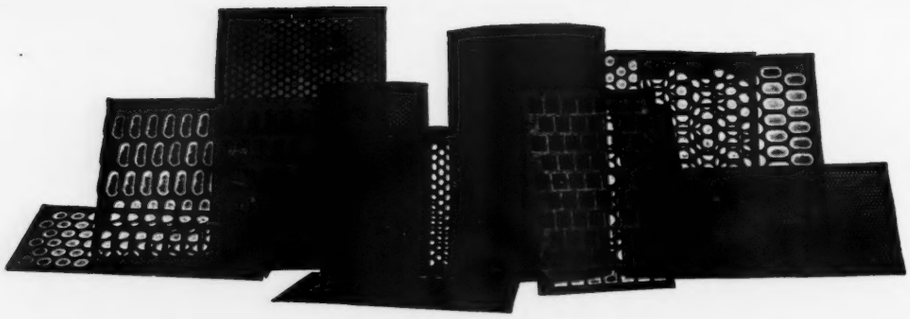

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Behind our recommendations to you lies years of experience which has taught us the best line of screens to use for a given work.

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Screens from coarsest to the finest materials either wet or dry

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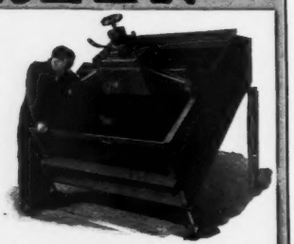

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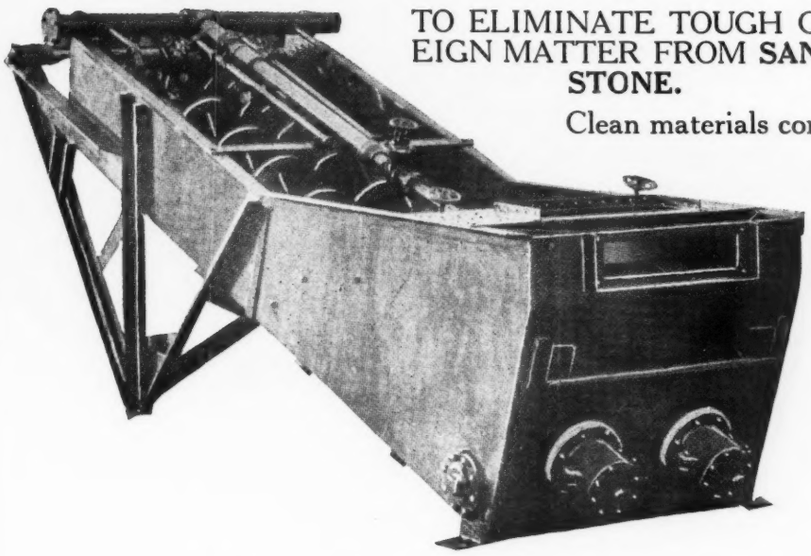

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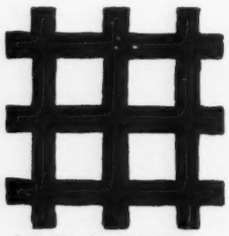
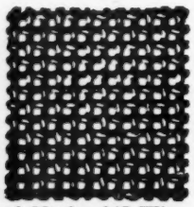


2½ Mesh; .105 Wire



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THE HUBBELL MASK CO.

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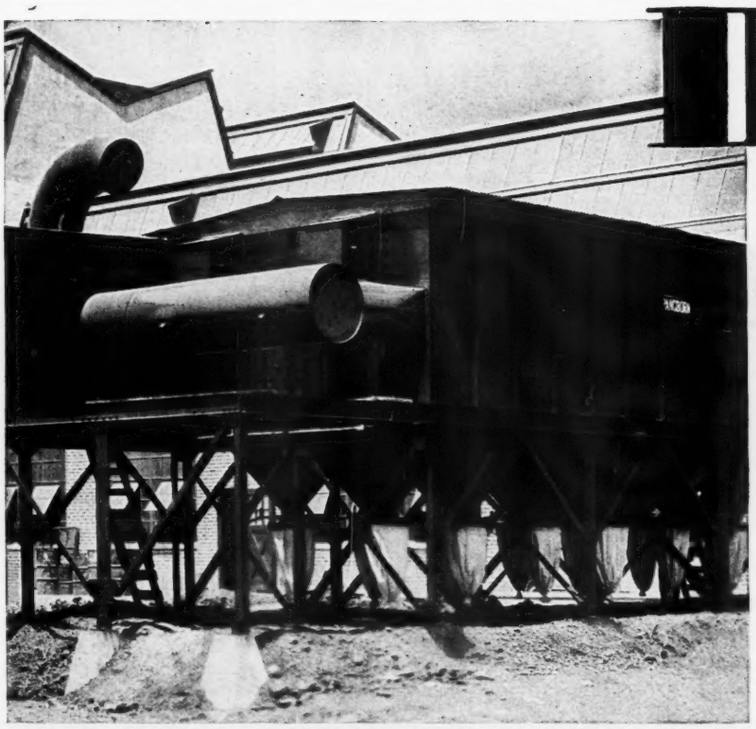

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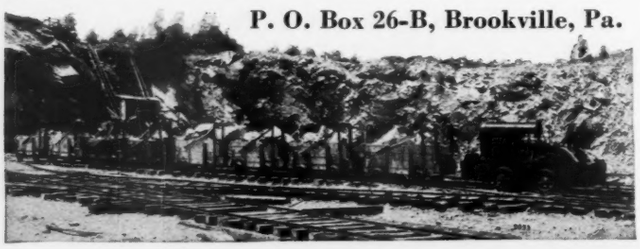

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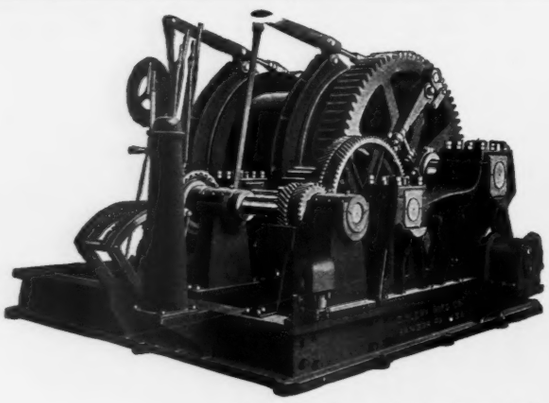

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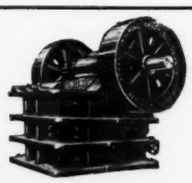

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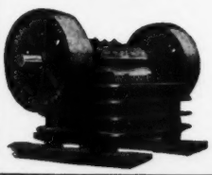

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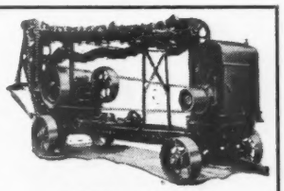

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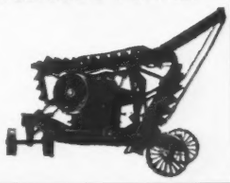

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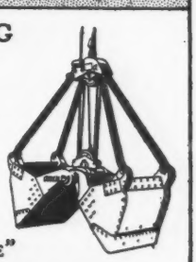

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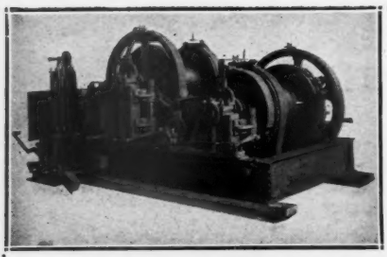

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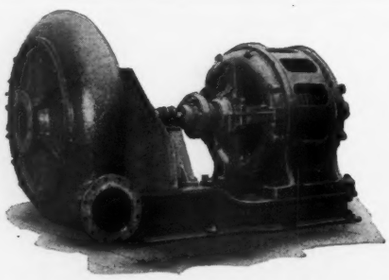

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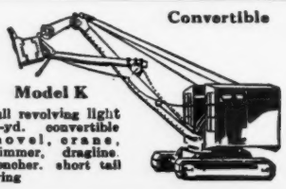

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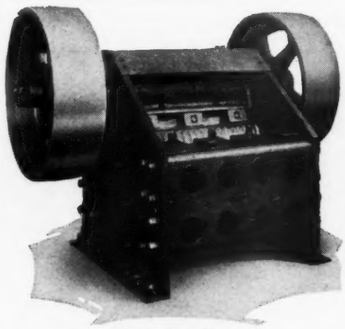

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538 So. Clark St. Chicago, Ill.

The PIT AND QUARRY Employment Service for subscribers has registered the following applicants for positions. Perhaps you have an opening in your organization for one of these men. If so, PIT AND QUARRY will be pleased to put you in touch with the applicant if you will advise us which one fills your requirements.

1-A. 12 years' experience Highway construction and sand and gravel. Can design and install own pits. Ready-Mix concrete. Have operated Central Mixing plants.

4. Quarry superintendent; 10 years' experience.

5. Chief engineer cement plant; 10 years' experience; desires connection with engineering or manufacturing firm, either in the office or in the field.

9. Quarry foreman, 6 years' experience.

10. Superintendent; 10 years' experience; lime and stone.

11. Superintendent crushed stone; 25 years' experience.

12. 10 years' experience in production of crushed gravel and sand; design engineer and builder; general superintendent; has had some sales experience. Experience covers the entire field.

14. Thoroughly experienced superintendent who has also in the past been assistant superintendent and foreman of granite and lime quarries; at present not employed.

15. Experienced superintendent or manager; graduate engineer; 12 years' experience in sand and gravel production and plant design.

16. Superintendent, 30 yrs. experience, mine, mill and quarry and large shovel operations, thorough knowledge of various systems of underground and open pit mining. Development work from grass roots to mill construction and operation, copper, iron, zinc and non-metallics, 4 yrs. special work in asbestos, mica and kaolin, good organizer and good production and safety record but not a college graduate. South, Southwest or Tropics preferred.

18. Superintendent of stone crushing and sand and gravel plant with considerable experience in operation of dredges, draglines, electric and steam shovels, all kinds of crushing, conveying, screening equipment. Can furnish excellent references, good record and details of past experience.

19. Electric Shovel Operator with considerable experience. Also power-house and general electrician, maintenance, welding, repairing gasoline truck motors, crushers, screens and various kinds of equipment.

20. Crushed stone superintendent since 1903; prefer West or Southwest territory; thoroughly experienced in construction and operation of plants, know how to get best results from the quarry end.

21. Cement plant superintendent or heavy limestone quarry; 20 years' experience in construction and operating plants.

22. In the capacity of plant and quarry superintendent 12 years. Prefer Oklahoma or Texas, or some Southern locality.

23. Superintendent, thoroughly experienced in operation of sand and gravel and crushed stone plants.

24. Superintendent, stone quarry or slag plant 16 years office and operating experience.

25. Dragline, Crane and Shovel Operator, 9 years experience in steam and 3 years on electric shovel (Marion), desires position as operator. Can do own repairing. Permanent connection desired. Married. References furnished. Will go anywhere, but a location near good schools preferred.

26. Operator with 5 years' experience on Link-Belt and Koehring cranes. Also 7 years' experience in sand and gravel pit. Available now. Go anywhere.

27. Laboratory work, 3 years' experience as Asst. Chemist doing control and analytical work. College graduate, B. S. degree.

28. 12 years' experience as cement burner and night foreman and watchman.

29. 14 years' practical quarry experience, office, sales, management, superintendent, reconstruction, etc. Open for new connection with progressive company, preferably sand and gravel concern.

30. Crushing plant and quarry Superintendent. Experience includes erecting, rebuilding and repairing machinery. Successful in organizing labor for economy. References furnished.

31. Superintendent crushing plant. 10 yrs. limestone and rock asphalt quarry operation experience. Can furnish best of references. Will go anywhere.

32. An overhead traveling bridge crane man. Experienced. Can give good references. Willing to go anywhere.

33. Cement mill general foreman, 12 years' experience, familiar with all requirements in construction and operation. Available immediately. Can locate anywhere. Single.

34. General foreman or asst. supt. of quarry and crushing plant. 25 yrs. experience in this line of business, in any kind of rock and all kinds of labor.

35. Superintendent of crushing and quarrying plant. 14 yrs.' experience in cement business, including changing plants from dry to wet process. Can furnish references.

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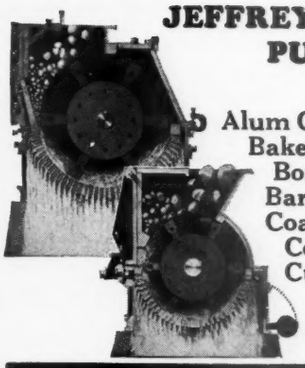

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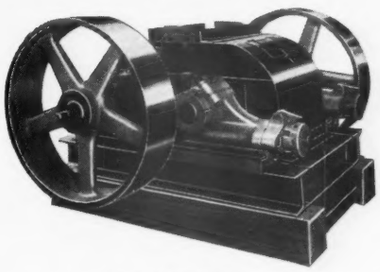

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Classified Buyers' Guide

A Directory of PIT AND QUARRY Advertisers Arranged According to Product

Although every effort is made to insure accuracy and completeness in these listings, the publisher cannot accept responsibility for errors or omissions. Any mistakes discovered will gladly be rectified, if brought to the attention of the Advertisers' Service Department.

Index to Advertisers on Page 107

Abrasives
Pangborn Corp.

Aggre Meter Plants
Erie Steel Const. Co.

Agitating Ladders (Dredge)
Eagle Iron Works
Ellicott Machine Corp.

Agitators, Thickeners and Slurry Mixers
Allen Cone and Machy. Corp.
Manitowoc Engineering Works
Traylor Eng. & Mfg. Co.

Air Compressors
Curtis Pneumatic Machy. Co.
Fuller Co.
Gardner-Denver Co.
Novo Engine Co.
O. K. Clutch & Machinery Co.
Traylor Eng. & Mfg. Co.

Air-Conditioning Equipment
Pangborn Corp.

Air Pumps
Fuller Co.

Air Separators
Gay Co., Inc., Rubert M.
McGann Mfg. Co.
Northern Blower Co.
Pangborn Corp.
Raymond Bros. Impact Pulv. Co.
Universal Road Machinery Co.

Ash- and Refuse-Handling Equipment
Colonial Iron Works Co.
Good Roads Machinery Co.
Haiss Mfg. Co., Geo.
Harnischfeger Corp.
Jeffrey Mfg. Co.
Link-Belt Co.
Stephens-Adamson Mfg. Co.

Automatic Weighers
Merrick Scale Mfg. Co.

Balls (Grinding)
Kennedy-Van Saun Mfg. and Eng. Corp.
Mid-West Steel Co.
Rogers Iron Works Co.

Balls (Tube-Mill, etc.)
Allis-Chalmers Mfg. Co.
Kennedy-Van Saun Mfg. and Eng. Corp.

Barges (Steel)
Hetherington & Berner
Manitowoc Engineering Co.
Norbom Engineering Co.

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Link-Belt Co.
Rogers Iron Works Co.
Sprout-Waldron Co.
Stephens-Adamson Mfg. Co.

Belt Dressing
Cling Surface Co.

Belt Fasteners
Bristol Co.

Belting
Cincinnati Rubber Mfg. Co.
Diamond Rubber Co
Robins Conveying Belt Co.
Thermoid Rubber Co.
Welch Eng. Service, F. M.

Bins (Concrete)
Burrell Eng. & Const. Co.

Bins (Steel)
Butler Bin Co.
Colonial Iron Works Co.
Erie Steel Construction Co.
Fremont Foundry and Machine Co.
Hetherington & Berner
Kennedy-Van Saun Mfg. and Eng. Corp.
Lorenson-Matthews Mfg. Co.
Seaverns Co., James B.

Bin Gates
Allis-Chalmers Mfg. Co.
Bacon, Inc., Earle C.
Butler Bin Co.
Erie Steel Construction Co.
Good Roads Machinery Co.
Haiss Mfg. Co., Inc., George
Hetherington & Berner
Industrial Brownhoist Corp.
Kennedy-Van Saun Mfg. and Eng. Corp.
Link-Belt Co.
Lorenson-Matthews Mfg. Co.
Morrow Mfg. Co.
Robins Conveying Belt Co.
Seaverns Co., Jas. B.
Smith Engineering Works
Stephens-Adamson Mfg. Co.
Traylor Eng. & Mfg. Co.

Blast-Hole Drills (See Drills—Blast-Hole)

Blasting Supplies
Du Pont De Nemours & Co., Inc., E. I.
Ensign-Bickford Co.
Keith Dunham Co.

Block Machines, (Concrete)
Besser Mfg. Co.

Blocks (Sheave)
American Hoist and Derrick Co.
Norbom Engineering Co.
Sauerman Bros.
Street Bros. Machine Works, Inc.

Blowers
Northern Blower Co.
Pangborn Corp.

Boats (Self-Unloading)
Smith Dock Co., L. D.

Bodies (Motor Truck, Concrete-Mixing)
Clinton Motors Corp.
Highway Truck Mixer Co.
Jaeger Machine Co.

Borings, Core
Pennsylvania Drilling Co.
Sprague and Henwood, Inc.

Brake Blocks
Gatke, Thomas L.
Midland Asbestos Corp.

Brake Linings
Gatke, Thomas L.
Midland Asbestos Corp.
Thermoid Rubber Co.

Brick Machinery (Sand-Lime and Slag)
Jackson & Church Co.
Riddell Co., W. A.

Brick Machines, (Concrete)
Besser Mfg. Co.

Bucket Elevators (See Conveyors and Elevators)

Buckets (Dragline Cableway)
Erie Steel Construction Co.
Link-Belt Co.
Sauerman Bros.
Street Bros. Machine Works, Inc.

Buckets (Elevator and Conveyor)
Bacon, Inc., Earle C.
Chain Belt Co.
Colonial Iron Works Co.
Cross Engineering Co.
Haiss Mfg. Co., Inc., George
Industrial Brownhoist Corp.
Jeffrey Mfg. Co.
Link-Belt Co.
Lorenson-Matthews Mfg. Co.
Norbom Engineering Co.
Robins Conveying Belt Co.
Smith Engineering Works.
Stearns Conveyor Co.
Stephens-Adamson Mfg. Co.

Buckets (Clamshell, Orange-Peel, etc.)
American Hoist & Derrick Co.
Erie Steel Construction Co.
Haiss Mfg. Co., Geo.
Industrial Brownhoist Corp.
Kiesler Co., Jos. F.
Link-Belt Co.
Orton Crane & Shovel Co.
Owen Bucket Co.
Williams Co., G. H.

Buckets (Electric)
Erie Steel Construction Co.

Buhr Mills
Ehrsam & Sons Mfg. Co., J. B.

Buildings, Steel
Butler Mfg. Co.

Cableways
American Steel & Wire Co.
Broderick & Bascom Rope Co.
Interstate Equipment Corp.
Link-Belt Co.
Roebling's Sons Co., John A.
Sauerman Bros. (Slackline)
Street Bros. Machine Works.

Calcining Kettles (Gypsum)
Ehrsam & Sons Mfg. Co., J. B.

Capstans (See Winches and Capstans)

Car Dumpers
Fairmont Mining Machinery Co.
Seaverns Co., Jas. B.

Car Pullers
Caldwell and Son Co., H. W.
Link-Belt Co.
Stephens-Adamson Mfg. Co.

Carriers
Smith Engineering Works
Sprout-Waldron Co.
Stephens-Adamson Mfg. Co.
Welch Eng. Service, F. M.

Cars (Dump)
Bethlehem Steel Co.
Koppel Industrial Car and Equip. Co.
Lorenson-Matthews Mfg. Co.
National Equipment Corp. (Insley Division)

Cars (Industrial)
Bethlehem Steel Co.
Koppel Industrial Car and Equip. Co.
Lorenson-Matthews Mfg. Co.
National Equipment Corp. (Insley Division)

Cars (Transfer)
Besser Mfg. Co.

Car Wheels (See Wheels—Car)

Castings
Bacon, Inc., Earle C.
Bethlehem Steel Co.
Briggs, Wm. C.
Eagle Iron Works
Fuller Lehigh Co.
Kennedy-Van Saun Mfg. and Eng. Corp.
Link-Belt Co.
Norbom Engineering Co.
Riddell Co., W. A.
Rogers Iron Works Co.

Cement Pumps (See Pumps; Air Pumps)

Central Mixing Plants
National Equipment Corp. (T. L. Smith Division)

Chain (Dredge and Steam-Shovel)
Jeffrey Mfg. Co.

Chain (Elevating and Conveying)
Chain Belt Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Norbom Engineering Co.
Riddell Co., W. A.
Stephens-Adamson Mfg. Co.

Chain Drives
Link-Belt Co.

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Colonial Iron Works Co.
Cross Engineering Co.
Haiss Mfg. Co., Geo.
Lorenson-Matthews Mfg. Co.
Morrow Mfg. Co.
National Equipment Corp. (Insley Division)
Rogers Iron Works Co.
Seaverns Co., Jas. B.

Clamshell Buckets (See Buckets—Clamshell, Orange-Peel, etc.)

Clamshell Gates (See Gates-Clamshell)

Classifiers
Allen Cone and Machy. Corp.
Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machine Co.
Link-Belt Co.
Pangborn Corp.
Stephens-Adamson Mfg. Co

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American Hoist and Derrick Co.
American Steel & Wire Co.
Broderick & Bascom Rope Co.

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Chain Belt Co.
Link-Belt Co.
O. K. Clutch & Machinery Co.

Clutches, Magnetic
Dings Magnetic Separator Co.

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Bethlehem Steel Co.
Fuller Lehigh Co.
Gay Co., Inc., Rubert M.
Kennedy-Van Saun Mfg. and Eng. Corp.
Pennsylvania Crusher Co.
Raymond Bros. Impact Pulv. Co.

Compressors (See Air Compressors)

Concentrators, Magnetic and Ore
Dings Magnetic Separator Co

Concentrators (Slurry)
Deister Concentrator Co

Cones (Sand-Washing)
Allen Cone Co.
Link-Belt Co.
Smith Engineering Works

Classified Buyers' Guide

A Directory of Pit and Quarry Advertisers Arranged According to Product

Index to Advertisers on Page 107

Contractors and Builders
Burrell Eng. & Const. Co.

Conveyor Belting (See Belting)

Conveyor Idlers and Rolls
Link-Belt Co.
Robins Conveying Belt Co.
Stephens-Adamson Mfg. Co.

Conveyor Magnets
Dings Magnetic Separator Co.

Conveyors (Ready Mixed Concrete)
Clinton Motors Corp.
Good Roads Machinery Co.
Highway Truck Mixer Co.
Jaeger Machine Co.

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Allis-Chalmers Mfg. Co.
Bacon, Inc., Earle C.
Barber Greene Co.
Chain Belt Co.
Colonial Iron Works Co.
Fairmont Mining Machinery Co.
Fuller Co.
Good Roads Machinery Co., Inc.
Haiss Mfg. Co., Inc., George
Industrial Brownhoist Corp.
Jeffrey Mfg. Co.
Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
Link-Belt Co.
Lorenson-Matthews Mfg. Co.
McLanahan and Stone Machine Co.
Morrow Mfg. Co.
New England Road Machy. Co.
Robins Conveying Belt Co.
Rogers Iron Works Co.
Seaverns Co., Jas. B.
Smith Engineering Works.
Sprout-Waldron & Co.
Stearns Conveyor Co.
Stephens-Adamson Mfg. Co.
Traylor Eng. & Mfg. Co.
Universal Crusher Co.
Universal Road Machinery Co.
Welch Eng. Service, F. M.
Williams Patent Crusher & Pulverizer Co.

Coolers (See Kilns and Coolers—Rotary)

Couplings (Hose, Pipe, etc.)
Cincinnati Rubber Mfg. Co.
Thermoid Rubber Co.

Cranes (Crawler and Locomotive)
American Hoist & Derrick Co.
Bay City Dredge Works
General Excavator Co.
Harnischfeger Corp.
Industrial Brownhoist Corp.
Link-Belt Co.
Manitowoc Engineering Works
National Equipment Corp. (Insley Division)
National Equipment Corp. (Koehring Division)
National Equipment Corp. (Parsons Division.)
Ohio Locomotive Crane Co.
Ohio Power Shovel Co.
Orton Crane & Shovel Co.

Cranes (Overhead Traveling Electric)
Erie Steel Construction Co.
Harnischfeger Corp.
Industrial Brownhoist Corp.

Crusher Parts
Briggs, Wm. C.
Kennedy-Van Saun Mfg. and Eng. Corp.
Mid-West Steel Co.
Rogers Iron Works Co.
Wheeling Mold & Fdry. Co

Crushers (Cone)
Nordberg Mfg. Co.

Crushers (Hammer)
Allis-Chalmers Mfg. Co.
Dixie Machinery Mfg. Co.
Jeffrey Mfg. Co.
Kennedy-Van Saun Mfg. and Eng. Corp.
Pennsylvania Crusher Co.
Universal Crusher Co.
Williams Patent Crusher and Pulverizer Co.

Crushers (Jaw and Gyratory)
Allis-Chalmers Mfg. Co.
Bacon, Inc., Earle C.
Buchanan Co., C. G.
Good Roads Machinery Co.
Kennedy-Van Saun Mfg. & Eng. Corp.
Lewistown Foundry & Machinery Co.
New England Road Machy. Co.
Nordberg Mfg. Co.
Rogers Iron Works Co.
Smith Engineering Works
Traylor Eng. & Mfg. Co.
Universal Crusher Co.
Universal Road Machy. Co.
Wheeling Mold & Fdry. Co.
Williams Patent Crusher & Pulverizing Co.

Crushers (Rotary)
Allis-Chalmers Mfg. Co.
Ehrsam & Sons Mfg. Co., J. B.

Crushers (Roll)
Allis-Chalmers Mfg. Co.
Bacon, Inc., Earle C.
Jeffrey Mfg. Co.
Kennedy-Van Saun Mfg. and Eng. Corp.
Link-Belt Co.
McLanahan-Stone Machine Co.
Pennsylvania Crusher Co.
Rogers Iron Works Co.

Crushing Rolls
Allis-Chalmers Mfg. Co.
Bacon, Inc., Earle C.
Buchanan Co., C. G.
Jeffrey Mfg. Co.
Rogers Iron Works Co.
Sturtevant Mill Co.
Traylor Eng. & Mfg. Co.

Derricks and Derrick Fittings
American Hoist & Derrick Co.
Harnischfeger Corp.
National Equipment Corp. (Insley Division)

Diesel Engines (See Engines—Diesel)

Dippers and Teeth (Power-Shovel)
Harnischfeger Corp.
Koehring Co.
Orton Crane & Shovel Co.

Dragline Cableway Excavators
American Hoist and Derrick Co.
Good Roads Machinery Co.
Link-Belt Co.
National Equipment Corp. (Inlsey Division)
Novo Engine Co.
Sauerman Bros.
Street Bros. Machine Works.

Dragline Excavators
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Harnischfeger Corp.
Industrial Brownhoist Corp.
Link-Belt Co.
Manitowoc Engineering Works
National Equipment Corp. (Insley Division)
National Equipment Corp. (Koehring Division)
Ohio Power Shovel Co.

Dredge Chain (See Chain)

Dredge Pipe (See Pipe)

Dredges
American Hoist and Derrick Co.
Bay City Dredge Works
Ellicott Machine Corp.
Hetherington & Berner, Inc.
Morris Machine Works
Norbom Engineering Co.
Randolph-Perkins Co.
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Yuba Mfg. Co.

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Gardner-Denver Co.

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Loomis Machine Co.

Drilling Contractors
Pennsylvania Drilling Co.
Sprague and Henwood, Inc.

Drills (Blast-Hole)
Gardner-Denver Co.
Keystone Driller Co.
Loomis Machine Co.

Drills, Diamond
Pennsylvania Drilling Co.
Sprague and Henwood, Inc.

Drills (Rock)
Gardner-Denver Co.

Drills (Well) (See Drills—Blast-Hole)

Drums, Magnetic
Dings Magnetic Separator Co.

Dryers
Allis-Chalmers Mfg. Co.
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Fuller Lehigh Co.
Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Fdry. & Mach. Co.
McGann Mfg. Co., Inc.
McLanahan and Stone Machine Co.
Prindle Mfg. Co., W. E.
Traylor Eng. & Mfg. Co.
Vulcan Iron Works

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Pangborn Corp.

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Lorenson-Matthews Mfg. Co.
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Pangborn Corp.
Raymond Bros. Impact Pulverizer Co.

Dust-Conveying Systems
Fuller Co.

Electrical Equipment
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Westinghouse Electric & Mfg. Co.

Elevators (See Conveyors and Elevators)

Engineers
Allen Cone Co.
Allis-Chalmers Mfg. Co.
Bacon, Inc., Earle C.
Burrell Eng. & Const. Co.
Fuller Co.
Hetherington & Berner, Inc.
Kennedy-Van Saun Mfg. and Eng. Corp.
McLanahan and Stone Machine Co.
Meade & Co., Richard K.
Pangborn Corp.
Randolph-Perkins Co.
Robins Conveying Belt Co.
Rogers Iron Works Co.
Stephens-Adamson Mfg. Co.
Welch Eng. Service, F. M.
Yuba Mfg. Co.

Engines (Diesel)
Buda Co.
Power Mfg. Co.
Nordberg Mfg. Co.

Engines (Hoisting)
American Hoist and Derrick Co.
Flory Mfg. Co., S.
Novo Engine Co.
Street Bros. Machine Works, Inc.

Engines (Internal-Combustion)
Buda Co.
Climax Eng. Co.
Hercules Motors Corp.
Le Roi Company
New England Road Machinery Co.
Nordberg Mfg. Co.
Novo Engine Co.
Power Mfg. Co.

Engines (Steam)
Ingersoll-Rand Co.
Morris Machine Works
Nordberg Mfg. Co.

Excavating Machinery (See Shovels; Cranes; Buckets; etc.)

Excavators, Shallow Grading (Bucket Elevator Type)
Haiss Mfg. Co., Geo.

Exhaust Equipment
Pangborn Corp.

Explosives
Du Pont De Nemours & Co., E. I.
Keith Dunham Co.

Feeders
Allis-Chalmers Mfg. Co.
Huron Industries, Inc.
Kennedy-Van Saun Mfg. and Eng. Corp.
Morrow Mfg. Co.
New England Road Machy. Co.
Pennsylvania Crusher Co.
Robins Conveying Belt Co.
Smith Engineering Works
Stephens-Adamson Mfg. Co.
Williams Patent Crusher & Pulverizer Co.

Filter Cloth
Oliver United Filters, Inc.

Filters (Cement Slurry)
Oliver United Filters, Inc.

Forgings (Steel)
Bethlehem Steel Co.
Harnischfeger Corp.
Vulcan Iron Works

Friction Blocks (Metallic)
Gatke, Thomas L.
Midland Asbestos Corp.

Classified Buyers' Guide

A Directory of PIT AND QUARRY Advertisers Arranged According to Product

Index to Advertisers on Page 107

Frogs and Switches
Bethlehem Steel Co.
Buda Co.

Fuses (Detonating)
Ensign-Bickford Co.

Gaskets
Cincinnati Rubber Mfg. Co.
Diamond Rubber Co.
Midland Asbestos Corp.
Thermoid Rubber Co.

Gasoline Engines (See Engines—Internal-Combustion)

Gates (Bin) (See Bin Gates)

Gates (Clamshell)
Erie Steel Construction Co.

Gears, Herringbone
Bacon, Inc., Earle C.

Gears and Pinions
Bacon, Inc., Earle C.
Bethlehem Steel Co.
Caldwell and Son Co., H. W.
Rogers Iron Works Co.
Stephens-Adamson Mfg. Co.
Vulcan Iron Works
Westinghouse Electric and Mfg. Co.

Generators (See Motors and Generators)

Glass Sand Equipment
Colonial Iron Works Co.
Lewistown Foundry & Machine Co.

Goggles
Willson Products, Inc.

Grab Buckets (See Buckets—Clamshell, Orange-Peel, etc.)

Grinding Balls
Jeffrey Mfg. Co.
Kennedy-Van Saun Mfg. and Eng. Corp.
Mid-West Steel Co.
Rogers Iron Works Co.
Tioga Steel & Iron Co.

Grizzlies
Allis-Chalmers Mfg. Co.
Eagle Iron Works
Fairmont Mining Machinery Co.
Good Roads Machinery Co., Inc.
Huron Industries, Inc.
Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Fdy. & Mach. Co.
Manganese Steel Forge Co.
Robins Conveying Belt Co.
Rogers Iron Works Co.
Smith Engineering Works
Stephens-Adamson Mfg. Co.
Traylor Eng. & Mfg. Co.
Universal Road Machy. Co.

Guns (Hydraulic)
Taylor Forge & Pipe Works
Universal Nozzle Co.
Yuba Mfg. Co.

Gypsum Plaster Plants
Ehrsam & Sons Mfg. Co., J. B.

Hammer Mills (See Crushers—Hammer)

Hammers, Crusher (Renewable Tip)
Briggs, Wm. C.

Haulage Systems, Electric
Woodford Engineering Co.

Hoists
American Hoist & Derrick Co.
Curtis Pneumatic Machinery Co.
Ellicott Machine Corp.
Flory Mfg. Co., S.
Gardner-Denver Co.
Harnischfeger Corp.
Industrial Brownhoist Corp.
Link-Belt Co.
McLanahan and Stone Machine Co.
New England Road Machinery Co.
Novo Engine Co.
National Equipment Corp. (C. H. and E. Division)
Rogers Iron Works Co.
Sauerman Bros.
Smith Engineering Works
Street Bros. Machine Works.

Hose Couplings (See Couplings)

Hose (Air, Steam, and Water)
Cincinnati Rubber Mfg. Co.
Diamond Rubber Co.
Thermoid Rubber Co.

Hydrators (Lime)
Jackson & Church Co.
McGann Mfg. Co., Inc.

Hydraulic Guns (See Guns—Hydraulic)

Idlers
Allis-Chalmers Mfg. Co.
Barber-Greene Co.
Good Roads Machinery Co.
Link-Belt Co.
Robins Conveying Belt Co.
Smith Engineering Works
Stearns Conveyor Co.
Stephens-Adamson Mfg. Co.
Sprout Waldron & Co.

Kettles (Calcining)
Ehrsam & Sons Mfg. Co., J. B.

Kilns and Coolers (Rotary)
Allis-Chalmers Mfg. Co.
Kennedy-Van Saun Mfg. and Eng. Corp.
McGann Mfg. Co., Inc.
Traylor Eng. & Mfg. Co.

Kilns (Vertical)
McGann Mfg. Co., Inc.

Lime-Handling Equipment
Fuller Co.
Link-Belt Co.
McGann Mfg. Co.
Raymond Bros. Impact Pulv. Co.

Lime and Hydrating Plants
McGann Mfg. Co., Inc.

Linings (Ball- and Tube-Mill) (See Mill Liners and Linings)

Liquid Oxygen
Keith Dunham Co.

Loaders and Unloaders
Barber-Greene Co.
Good Roads Machinery Co., Inc.
Haiss Mfg. Co., Geo.
Harnischfeger Corp.
Industrial Brownhoist Corp.
Jeffrey Mfg. Co.
Link-Belt Co.
Nelson Iron Works
New England Road Machy Co.
Robins Conveying Belt Co.
Stephens-Adamson Mfg. Co.

Locomotives (Electric, Gas, and Steam)
Brookville Locmotive Co.
Jeffrey Mfg. Co.
Lima Locomotive Works
Milwaukee Locomotive Mfg. Co.
Porter Co., H. K.
Westinghouse Electric and Mfg. Co.

Magnetic Clutches (See Clutches, Magnetic)

Magnets, High Intensity
Dings Magnetic Separator Co.

Magnets, Standard and Special
Dings Magnetic Separator Co

Manganese Steel Castings
Bethlehem Steel Co.
Manganese Steel Forge Co
Riddell Co., W. A.

Masks, Protective
Hubbell Mask Co.

Mechanical Rubber Goods
Cincinnati Rubber Mfg. Co.
Diamond Rubber Co.
Thermoid Rubber Co.

Mill Liners and Linings (Iron for Ball and Tube Mills)
Jeffrey Mfg. Co.
Kennedy-Van Saun Mfg. and Eng. Corp.

Mills (Grinding) (See also Crushers—Hammer)
Allis-Chalmers Mfg. Co.
Ehrsam & Sons Mfg. Co., J. B.
Ellis Mills Mfg. Co.
Fuller Lehigh Co.
Jackson & Church Co.
Lewistown Fdy. & Mach. Co.
Raymond Bros. Impact Pulv. Co.
Rogers Iron Works Co.
Traylor Eng. & Mfg. Co.

Mineral Magnetic Separators
Dings Magnetic Separator Co.

Mixers (Plaster, Fiber and Retarder)
Ehrsam & Sons Mfg. Co., J. B.

Mixers (Concrete and Sand)
Besser Mfg. Co.

Motor Trucks
Clinton Motors Corp.

Motors and Generators
Allis-Chalmers Mfg. Co.
Westinghouse Electric & Mfg. Co.

Motors (Internal-Combustion) (See Engines—Internal-Combustion)

Nozzles (Hydraulic) (See Guns—Hydraulic)

Nozzles (Suction Screen)
Eagle Iron Works

Nuggets (Tube Mill Grinding)
Mid-West Steel Co.

Oils (Lubricating)
Texas Co.

Ore Separators
Dings Magnetic Separator Co.

Oxygen (Liquid) (See Liquid Oxygen)

Packings (Pump, Valve, etc.)
Cincinnati Rubber Mfg. Co.
Diamond Rubber Co.

Pawls (Safety)
Stephens-Adamson Mfg. Co.

Perforated Metals
Allis-Chalmers Mfg. Co.
Bacon, Inc., Earle C.
Chicago Perforating Co.
Cross Engineering Co.
Morrow Mfg. Co.
Rogers Iron Works Co.
Standard Stamping & Perforating Co.

Pipe, Concrete, Machinery
Quinn Wire and Iron Works.

Pipe, Dredge (Floating and Shore)
Bethlehem Steel Co.
Ellicott Machine Corp.
Fremont Foundry and Machine Co.
Taylor Forge & Pipe Works

Pipe Flanges
Fremont Foundry and Machine Co.
Taylor Forge and Pipe Works

Plants (AggreMeter)
Erie Steel Construction Co.

Plug Valves (See Valves)

Pneumatic Drills (See Drills)

Portable Conveyors
Barber-Greene Co.
Fuller Co.
Haiss Mfg. Co., Geo.
Link-Belt Co.
Robins Conveying Belt Co.
Stephens-Adamson Mfg. Co.

Portable Engines (See Engines—Internal Combustion)

Portable Loaders (See Loaders and Unloaders)

Protectors, Crusher
Dings Magnetic Separator Co.

Pulleys (Magnetic)
Dings Magnetic Separator Co.

Pulverized Fuel Systems
Fuller Lehigh Co.
Gay Co., Rubert M.
Kennedy-Van Saun Mfg. & Eng. Corp.
Raymond Bros. Impact Pulverizer Co.

Pulverizers (See also Crushers; Mills; etc.)
Allis-Chalmers Mfg. Co.
Bethlehem Steel Co.
Dixie Machinery Mfg. Co.
Fuller Lehigh Co.
Jeffrey Mfg. Co.
Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
Raymond Bros. Impact Pulverizer Co.
Universal Crusher Co.
Williams Patent Crusher and Pulverizer Co.

Pumps (Acid Centrifugal)
Oliver United Filters, Inc.

Pumps (Air-Lift)
Fuller Co.

Pumps (Cement-Slurry)
Fuller Co.
Morris Machine Works.

Pumps (Centrifugal)
Allis-Chalmers Mfg. Co.
American Well Works
Chain Belt Co.
Erie Pump & Engine Works
Fremont Foundry and Machine Co.
Hetherington & Berner, Inc.
Morris Machine Works
National Equipment Corp. (C. H. and E. Division)
Norbom Engineering Co.
Novo Engine Co.
Swaby Mfg. Co.

Pumps (Sand and Gravel)
Allis-Chalmers Mfg. Co.
American Well Works
Ellicott Machine Corp.
Erie Pump & Engine Works
Fremont Foundry and Machine Co.
Hetherington & Berner, Inc.
Kansas City Hay Press Co.
Morris Machine Works
Norbom Engineering Co.
Novo Engine Co.
Swaby Mfg. Co.

Classified Buyers' Guide

A Directory of PIT AND QUARRY Advertisers Arranged According to Product

Index to Advertisers on Page 107

Ready-Mixed Concrete Plants
Erie Steel Construction Co.
National Equipment Corp. (T. L. Smith Division)

Respirators
Willson Products, Inc.

Rock Drills (See Drills—Rock)

Rod Mills
Jackson & Church Co.
Kennedy-Van Saun Mfg. and Eng. Corp.
Traylor Eng. & Mfg. Co.

Rope (Wire) (See Wire Rope)

Rubber Covering (Plastic)
Hitchcock Co., (Covulc)

Safety Appliances
Pangborn Corp.
Willson Products, Inc.

Sand-Blast Equipment
Pangborn Corp.

Sand-Lime Brick Machinery
Jackson & Church Co.
Riddell Co., W. A.
Rogers Iron Works Co.

Sand Separators
Allen Cone Co.
Smith Engineering Works
Stephens-Adamson Mfg. Co.

Sand-Settling Tanks
Allen Cone Co.
Good Roads Machinery Co.
Link-Belt Co.
Smith Engineering Works
Stephens-Adamson Mfg. Co.
Welch Eng. Service, F. M.

Scrapers (Power Drag)
Link-Belt Co.
New England Road Machinery Co.
Sauerman Bros.
Street Bros. Machine Works, Inc.

Screens
Allis-Chalmers Mfg. Co.
Bacon, Inc., Earle C.
Chain Belt Co.
Chicago Perforating Co.
Cleveland Wire Cloth & Mfg. Co.
Cross Engineering Co.
Deister Concentrator Co.
Deister Machine Co.
Eagle Iron Works
Ehrsam & Sons Mfg. Co., J. B.
Fairmont Mining Machinery Co.
Gay Co., Inc., Rubert M.
Good Roads Machinery Co.
Haiss Mfg. Co., Inc., George
Huron Industries, Inc.
Industrial Brownhoist Corp.
Jeffrey Mfg. Co.
Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
Link-Belt Co.
Lorenson-Matthews Mfg. Co.
McLanahan-Stone Machine Co.
Manganese Steel Forge Co.
Morrow Mfg. Co.
New England Road Machy. Co.
Productive Equipment Corp.
Robins Conveying Belt Co.
Rogers Iron Works Co.
Sprout, Waldron & Co.
Smith Engineering Works
Standard Stamping & Perforating Co.
Stearns Conveyor Co.
Stephens-Adamson Mfg. Co.
Sturtevant Mill Co.
Traylor Eng. & Mfg. Co.
Tyler Co., W. S.
Universal Crusher Co.
Universal Road Machinery Co.
Universal Vibrating Screen Co.
Welch Eng. Service, F. M.

Screens (Vibrating or Shaking)
Deister Concentrator
Deister Machine Co.
Fairmont Mining Machinery Co.
Gay Co., Inc. Rubert M.
Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
Link-Belt Co.
McLanahan and Stone Machine Co.
Productive Equipment Corp.
Robins Conveying Belt Co.
Rogers Iron Works Co.
Stephens-Adamson Mfg. Co.
Sturtevant Mill Co.
Tyler Co., W. S.
Universal Vibrating Screen Co.

Seal Rings
Huron Industries, Inc.

Separators (Air) (See Air Separators)

Separators, Electro Magnetic
Dings Magnetic Separator Co.

Separators (Magnetic)
Dings Magnetic Separator Co.

Sheaves
Allis-Chalmers Mfg. Co.
American Hoist & Derrick Co.
Eagle Iron Works
Haiss Mfg. Co., Geo.
Hetherington & Berner
Rogers Iron Works Co.
Sprout-Waldron Co.
Stephens-Adamson Mfg. Co.

Shovels (Electric, Internal-Combustion, and Steam)
American Hoist & Derrick Co.
Bay City Dredge Works
General Excavator Co.
Goodman Mfg. Co.
Harnischfeger Corp.
Industrial Brownhoist Corp.
Link-Belt Co.
Manitowoc Engineering Works
National Equipment Corp. (Insley Division)
National Equipment Corp. (Koehring Division)
Ohio Power Shovel Co.
Orton Crane and Shovel Co.

Silos
Burrell Eng. & Constr. Co.

Skip Hoists and Skips
Allis-Chalmers Mfg. Co.
American Hoist and Derrick Co.
Colonial Iron Works Co.
Link-Belt Co.
National Equipment Corp. (Insley Division)
Robins Conveying Belt Co.
Stephens-Adamson Mfg. Co.
Street Bros. Machine Works, Inc.
Welch Eng. Service, F. M.

Sleeves (Dredge)
Cincinnati Rubber Mfg. Co.
Diamond Rubber Co.
Thermoid Rubber Co.

Speed Reduction Units
Bacon, Inc., Earle C.
Huron Industries, Inc.
Link-Belt Co.
Stephens-Adamson Mfg. Co.
Westinghouse Electric and Mfg. Co.

Spouts (See Chutes and Chute Liners)

Spouts, Magnetic
Dings Magnetic Separator Co.

Sprockets and Chain
Jeffrey Mfg. Co.
Link-Belt Co.

Stackers
Welch Engineering Service, F. M.

Steel Plate Construction
Colonial Iron Works Co.
Lorenson-Matthews Mfg. Co.
Seaverns Co., Jas. B.
Sprout-Waldron & Co.

Storage Equipment
Sauerman Bros.
Stephens-Adamson Mfg. Co.

Tanks (Sand-Settling)
Allen Cone Co.
Colonial Iron Works Co.
Good Roads Machinery Co.
Link-Belt Co.
Morrow Mfg. Co.
Smith Engineering Works
Stephens-Adamson Mfg. Co.
Welch Eng. Service, F. M.

Thickeners, Slurry
Oliver United Filters Inc.

Tile, Concrete, Machinery
Quinn Wire and Iron Works.

Tools (Drill) (See Drilling Accessories)

Track Shifters
Nordberg Mfg. Co.

Tractors
Allis-Chalmers Mfg. Co.
Caterpiller Tractor Co.

Tramways (Aerial)
American Steel & Wire Co.
Broderick & Bascom Rope Co.
Interstate Equipment Corp.
Roebling's Sons Co., John A.
Williamsport Wire Rope Co.

Transformers
Allis-Chalmers Mfg. Co.
Westinghouse Electric and Mfg. Co.

Transmission Belting
Cincinnati Rubber Mfg. Co.
Diamond Rubber Co.
Thermoid Rubber Co.

Transmission Machinery
Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Bacon, Inc., Earle C.
Chain Belt Co.
Link-Belt Co.
Sprout-Waldron & Co.
Stearns Conveyor Co.
Stephens-Adamson Mfg. Co.

Trippers
Good Roads Machinery Co.
Link-Belt Co.
Robins Conveying Belt Co.
Sprout-Waldron & Co.
Stephens-Adamson Mfg. Co.

Truck Cranes (See Cranes)

Tube Mills (See Mills—Ball, Tube, etc.)

Tube-Mill Liners (See Mill Liners and Linings)

Turbines (Deep-Well)
American Well Works

Underground Loaders
Allis-Chalmers Mfg. Co.

Unloaders (Box-Car)
Link-Belt Co.
Stephens-Adamson Mfg. Co.

Valves (Pump)
Cincinnati Rubber Mfg. Co.
Taylor Forge & Pipe Works

Variable Speed Reducers or Transmissions
Stephens-Adamson Mfg. Co.

Ventilating Apparatus
Pangborn Corp.

Vibrating Screens (See Screens—Vibrating)

Washers (Sand, Gravel, and Stone)
Allen Cone and Machy. Corp.
Allis-Chalmers Mfg. Co.
Bacon, Inc., Earle C.
Eagle Iron Works
Good Roads Machinery Co.
Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
Link-Belt Co.
McLanahan-Stone Machinery Co.
New England Road Machy. Co.
Perfect Classifier Co.
Smith Engineering Works
Stephens-Adamson Mfg. Co.
Traylor Eng. & Mfg. Co.
Universal Road Machinery Co.
Welch Eng. Service, F. M.

Weighing Equipment (Automatic)
Merrick Scale Mfg. Co.

Welding Supplies
American Steel & Wire Co.
Manganese Steel Forge Co.
Roebling's Sons Co., John A.

Well Drills (See Drills—Well)

Wheels (Car)
Buda Co.
Eagle Iron Works
Fairmont Mining Machinery Co.
Rogers Iron Works Co.

Winches and Capstans
Stephens-Adamson Mfg. Co.
Street Bros. Machine Works, Inc.

Wire Cloth
Cleveland Wire Cloth & Mfg. Co.
Manganese Steel Forge Co.
Tyler Co., W. S.

Wire Rope
American Steel & Wire Co.
Broderick & Bascom Rope Co.
Roebling's Sons Co., John A.
Williamsport Wire Rope Co.

Wire-Rope Fittings
American Hoist and Derrick Co.
American Steel & Wire Co.
Broderick & Bascom Rope Co.
Roebling's Sons Co., John A.
Williamsport Wire Rope Co.

Wire-Rope Slings
American Steel & Wire Co.

Wire (Welding)
American Steel & Wire Co.

Worm Gears (See Gears and Pinions)

Rates for display advertisements in the Broadcast Section are given below. If you want to buy or sell used equipment, if you want a job or need a man, advertise your wants in Pit and Quarry. Advertisement copy for publication in the next issue should reach our office within one week after the date of this issue.

RATES PER INSERTION	1 Inch	2 Inches	3 Inches	4 Inches	5 Inches	6 Inches	8 Inches	9 Inches	10 Inches	12 Inches	15 Inches	20 Inches	30 Inches
1 Insertion	$ 3.75	$ 7.25	$10.75	$14.25	$17.75	$21.25	$28.25	$31.75	$35.25	$42.25	$ 56.25	$70.25	$105.00
2 Insertions	3.75	7.25	10.70	14.20	17.65	21.15	28.15	31.65	35.15	42.15	56.15	70.00	104.00
3 Insertions	3.75	7.20	10.65	14.15	17.55	21.05	28.05	31.55	35.10	42.05	56.05	69.75	103.00
4 Insertions	3.70	7.15	10.60	14.10	17.45	20.95	27.95	31.45	35.00	41.95	55.90	68.75	101.00
8 Insertions	3.65	7.05	10.50	14.00	17.25	20.75	27.75	31.25	34.80	41.75	55.70	67.50	98.00
13 Insertions	3.60	6.95	10.40	13.90	17.05	20.55	27.55	31.05	34.60	41.55	55.55	66.25	94.00
26 Insertions	3.50	6.75	10.20	13.70	16.65	20.05	27.05	30.65	34.20	41.05	55.05	64.00	88.00

INFORMATION — "Broadcast" space is sold by the advertising "inch." Each page contains 30 inches. The width of the page is divided into 3 columns, each 2¼ inches wide. Each column contains 10 inches measured the length of the column. Any space may be used measured by the *even* inch in height (not fractions), by 1, 2 or 3 columns in width The size of a space is its height in inches multiplied by the number of columns in width. Example: a space 3 inches high by 2 columns wide is 6 inches. Copy changes made without additional charge.

It Pays to Advertise in PIT AND QUARRY

"Results entirely satisfactory to us"—

THE AMERICAN AGRICULTURAL CHEMICAL CO.

COMPLETE SERVICE PUBLISHING COMPANY

538 South Clark Street — CHICAGO

CRANES, SHOVELS, AND DRAGS

Northwest 104 Dragline, 50 ft. boom, 1-yd.
Insley Shovel, Gas Cat. ¾-yd.
Bucyrus 50-B Diesel Dragline, ¾-yd.
Northwest 105 Shovel ¾ yard and 1 yd.
Marion 92, Caterpillar, Electric 4-yd. Shovel.
Universal Truck Crane with Bucket.
Speeder ½-yd. Gas. Cat. Shovel.
Wilford Universal Shovel, ¼ yd.
OTHER MAKES AND SIZES ON HAND

CRUSHERS

Farrell, 36x42, Jaw.
Kennedy Gearless Reduction, Nos. 37 and 25.
Superior McCully 6-in. reduction.
Symons, 2 ft. Cone Crusher.
Carroll Jaw 24X36, mang. fitted.
Traylor Jaw 60x84.
Allis Chalmers Crushing Rolls, 42x16-in.
Traylor 16-in. Gyratory, like new.
Brainard Universal No. 12 Pulverizer.
Allis-Chalmers 8-K, 7½-K, 6-K, 5-K, 4-K and No. 3.
Western Aurora 9x16 and 11x20 Portable.
McCully Gyratory No. 8, No. 5, No. 4 and No. 3.
Allis-Chalmers Blake Type 12x24 Jaw. LOW PRICE.
Austin No. 10, No. 6 and No. 5 and No. 4 gyratory.
Good Roads 10x20 portable and 10x20 stationary.
Hardinge Mills 36"x8" with Motor.
Symons Disc 48 in., 36 in., 24 in. and 18 in.
Jeffrey Hammer Mill type A, 36x24 in.
Stephens-Adamson all-steel Bucket Elevator.
Belt Conveyors, 40 ft. x 18 in. and other sizes.
Allis-Chalmers Pan Conveyor, 90' center.
Raymond high side 5 Roll Pulverizer.
Ingersoll Rand Drill Sharpeners No. 4, 5 and 50.
OTHER CRUSHERS, SCREENS AND CONVEYORS
COMPRESSORS, CARS, LOCOMOTIVES, BOILERS
BUCKETS AND POWER EQUIPMENT

F. MAYER
53 W. Jackson Blvd. — Chicago, Ill.

FOR SALE

SPECIALS

4—28"x36", 24"x36" Traylor Jaw Crushers
1—36"x54" Buchanan Jaw Crusher.
1—24"x36" Farrel 15-B Jaw Crusher.
20—Gyratory Crushers, 42" McCulley, 30" McCulley, 10 K Gates, 10 Austin, 9 K Gates, 8 Gates, 8 Kennedy, 7½ Kennedy, 16 Traylor, 14" new Allis Chalmers, 37 Kennedy, and all smaller sizes.
1—6' McCulley Fine Red. Crusher, Rebuilt.
1—7' Newhouse with 60 H. P. 3/60/220 motor.
6—4x16, 40"x20', 4x20 Allis Chalmers Screens.
3—36"x16', Allis Chalmers and Traylor Rolls.
3—20"x14" Allis Chalmers and Sturtevant Rolls.
2—5' 6" x 20' Smidth Silex Lined Tube Mills.
1—4' x 7' Kennedy Steel Lined Rod-Ball Mill.
4—2 and 5 roll Raymond High Side Mills.
3—6' x 22", 6' x 30" Hardinge Ball Mills.
2—36"x24", 42"x36" Jeffrey Swing Hammer Mills.
20—4x20, 4x30, 5x30, 6' 6"x40, 6x60, 8'x60' Direct Heat Rotary Dryers.
2—New 4'x5' No. 37 Tyler Screens. 2 and 3 surface
1—Tyler Screen No. 31.3 deck, two 4x5 sections.
1—No. 32 Marcy Ball Mill.

Jaw, Gyratory, Roll Crushers, all sizes, types.
Rotary Kilns, Dryers, all sizes, types, not listed above.
Swing Hammer Mills, all sizes, types.

We have just issued latest list No. 10 Request your copy

Consolidated Products Co. Inc.
17-19 Park Row, New York City
Barclay 0600
Shops and Yards at Newark, N. J., cover six acres.
WE WILL BUY YOUR SURPLUS MACHINERY

DERRICKS

1—10-ton 100-ft. boom Terry all steel stiffleg.
1—5-ton Insley Steel Guy 95-ft. mast, 85-ft. boom, 12-ft. Bullwheel boom operating.
1—5-ton 50-ft. boom steel stiffleg.

HOISTING ENGINES

1—80 H. P. Lidgerwood, 2-drum 80 H. P. A. C. 440 v. 3 ph., 60 cy. Motor, Controller and Grids.
1—75 H. P. National Triple Drum Independent Motor Driven Swingers and Banked Lever Controls, 3 phase, 60 cycle, 440 volts.
1—60 H. P. National 3-drum Elec., with Swinger
1—70 H. P. Lidgerwood Gas, 3-drum with Swinger.
1—50 H. P. Lidgerwood Gas, 3-drum with Swinger.
1—10x12 3-drum Clyde Skeleton with Swinger.
1—8¼x10 Lidgerwood Triple Drum, A. S. M. E. Boiler.

BROAD GAUGE CRANES

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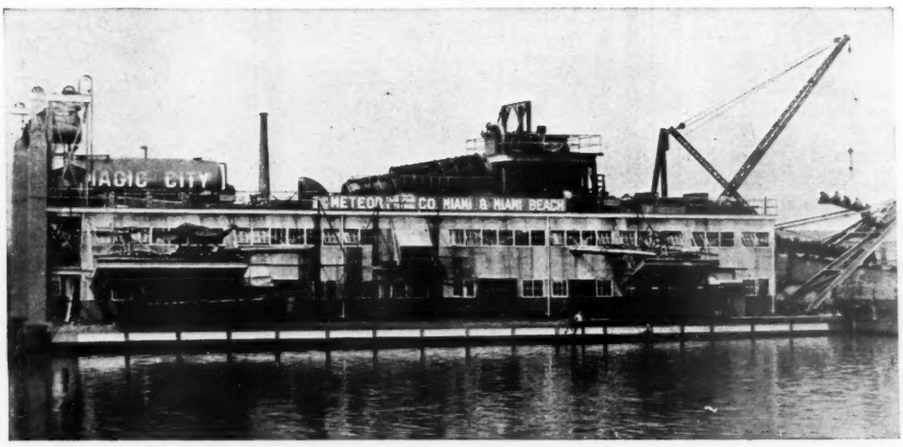

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¾ to 3½ cu. yd. cap. Clamsh. and Dragline.

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1—Stephens-Adamson Mfg. Co. 42" diam. screen	300.00
1—Manistee Water Pump, 1200 gal. per minute, direct connected on steel base	300.00
2—Erie Steam Shovels, 1¼ yd. bucket, ea.	1,500.00
1—Monighan 2W Dragline, 2½ yd. bucket, Fairbanks-Morse Diesel driven	20,000.00
1—Porter Locomotive, 12 x 16, standard gauge	5,000.00
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Entire 24" Conveyor Assembly, 250 ft. centers, consisting of head, and tail pulleys, automatic take-up, gears, pinion, clutch, bearing, shafting, upper and lower carriers, rubber belt	1,627.00
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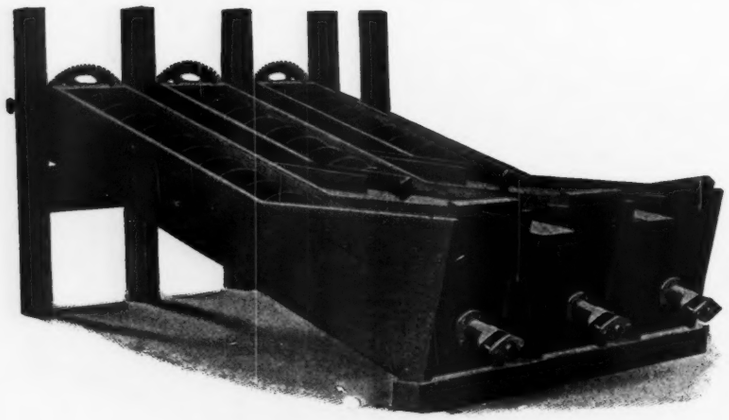

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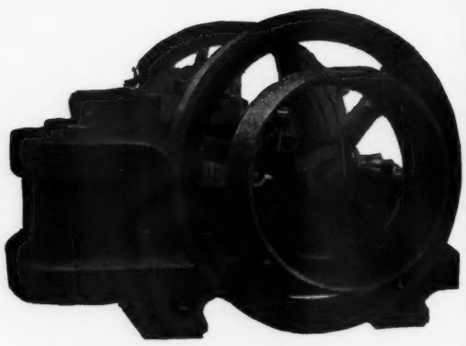

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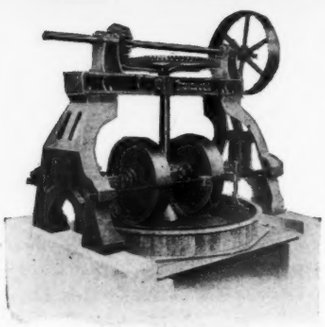

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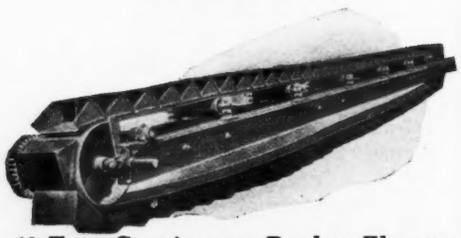

40 Foot Continuous Bucket Elevator

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Lewistown, Pa.

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Index to Advertisers

*American Hoist and Derrick Co..... 83
American-Terry-Derrick Co..... 95

*Bacon, Inc., Earle C..... 6
*Bay City Shovels, Inc..... 92
*Bethlehem Steel Co..... 7
Birmingham Rail and Locomotive Co.....104
Broadcast Section.....100-105
*Brookville Locomotive Co..... 90
*Burrell Engineering and Const. Co..... 93
Butler Mfg. Co..... 84

Caldwell and Son Co., H. W.....108
Caterpillar Tractor Co..... 4
Chicago Perforating Co..... 86
*Clapp, Riley and Hall Equipment Co.....102
Cleveland Wire Cloth & Mfg. Co..... 88
*Clinton Motors Corp..... 9
Cohen, Chas F.....103
Colonial Iron Works Co..... 92
Consolidated Products Co.....100
*Cross Engineering Co..... 86

*Deister Machine Co..... 82
Dings Magnetic Separator Co..... 91
Dixie Machinery Mfg. Co..... 84

*Eagle Iron Works..... 15
*Ellicott Machine Corp..... 92
Equipment Corporation of America.....103
*Erie Steel Construction Co..... 85
Excavating Equipment Dealers, Inc.....102

Flory Mfg. Co., S..... 90
*Fuller Lehigh Co..... 95

*Gay Co., Rubert M..... 91
*Good Roads Machinery Co..... 93
Grand Rapids Gravel Co.....104
*Gregory Electric Co.....103
Grey Steel Products Co.....100
Guion, H. P.....101 and 105

Haiss Mfg. Co., The George.....16-100
Hubbell Mask Co..... 89

Interstate Equipment Corp..... 91

*Jeffrey Mfg. Co..... 95

Kansas City Hay Press Co..... 92
*Keith-Dunham Co.....Inside Front Cover
*Kennedy-Van Saun Mfg. and Eng. Corp..... 81
*Keystone Driller Co..... 82
Kiesler Co., Jos. F..... 93

Le Roi Co.....Back Cover
Lewistown Foundry and Machine Co.....106
Lewis Sons, L. W.....100
*Link-Belt Co..... 3
Lorenson-Matthews Mfg. Co..... 86

Martin Machinery Co., E. A.....105
Mayer, F.....100-103
McGann Mfg. Co..... 95
*McLanahan and Stone Machine Co..... 93
Meade & Co., Richard K.....105
*Merrick Scale Mfg. Co..... 88
Mid-West Steel Co..... 90
*Morris Machine Works..... 92
Morrison Railway Supply Corp.....104
Morrow Mfg. Co..... 86

*Nelson Iron Works..... 5
*Norbom Engineering Co..... 92
*Northern Blower Co..... 95

Ohio Locomotive Crane Co..... 90
Owen Bucket Co..... 91

Pangborn Corp..... 89
Pennsylvania Drilling Co.....105
Perfect Classifier Co..... 87
Perry Buxton Doane Co.....104
*Porter Co., H. K.....Front Cover
Prindle Mfg. Co., W. E..... 95

Quarry Managers' Journal, Ltd..... 87

Randolph-Perkins Co..... 95
Raymond Bros. Impact Pulverizer Co..... 93
Rogers Iron Works Co..... 95

*Sauerman Bros., Inc..... 92
Schoonmaker and Sons, A. G.....102
*Smith Engineering Works..... 1
Southern Iron & Equipment Co.....104
Sprague and Henwood, Inc.....105
Stephens-Adamson Mfg. Co..... 13
Street Bros. Machine Works..... 92

*Traylor Engineering and Mfg. Co..... 85
*Tyler Co., W. S..... 86

*Universal Crusher Co..... 91
Universal Nozzle Co..... 92
Universal Road Machinery Co..... 88

Weiss, B. M.....100
Welch Engineering Service, The F. M..... 11
Western Contractors Supply Co.....102
*Wheeling Mold & Foundry Co..... 83
Williamsport Wire Rope Co.....Inside Back Cover
*Wood, James.....102

Yuba Mfg. Co..... 92

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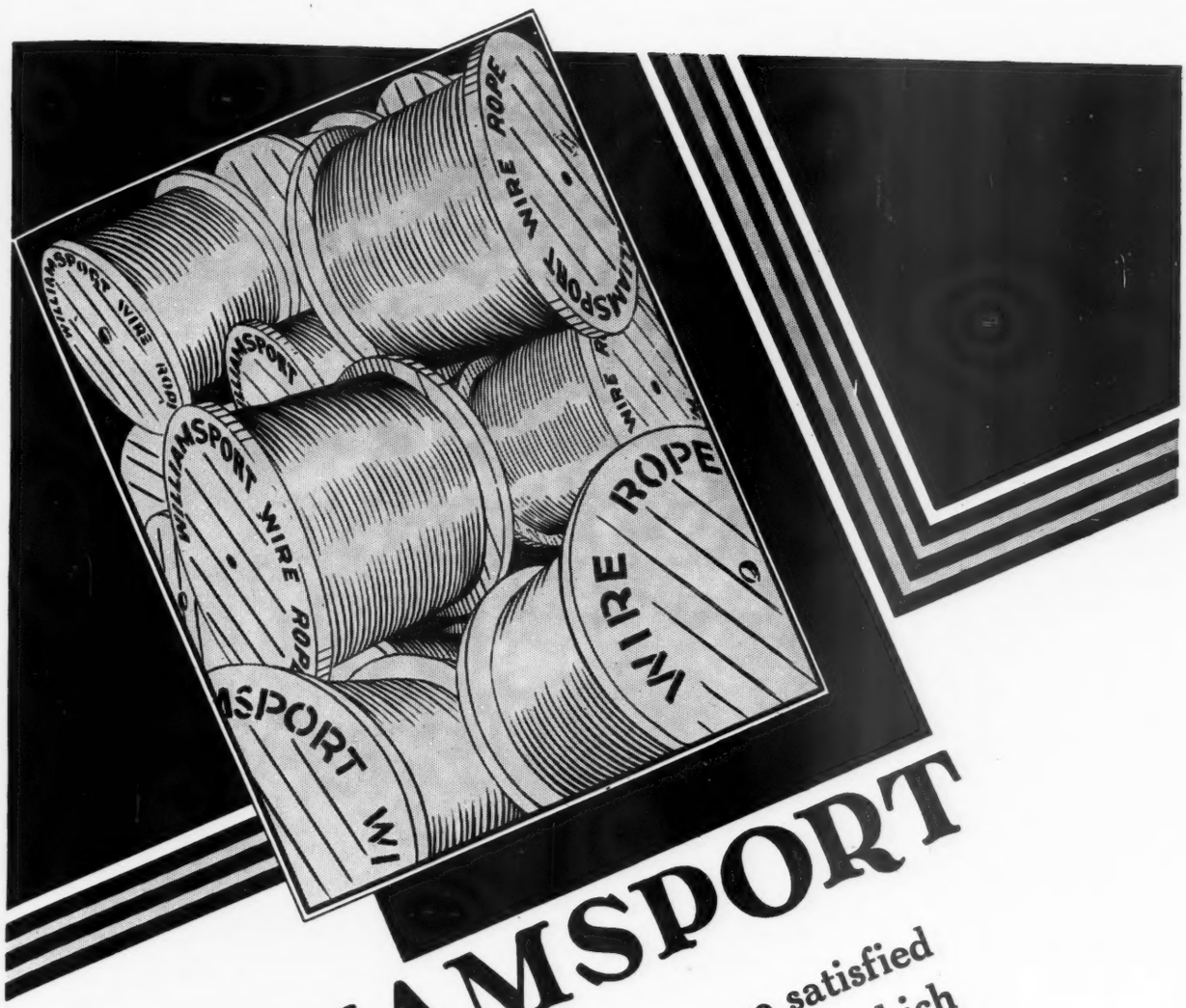

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